The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Mathematics & Other Sciences

MATHEMATICS is to many people the stumbling-block of science. It is taught in early life as arithmetic, algebra, and geometry; and an abiding hatred of the subject may be set up by the technique of the teacher. It often appears to have little value other than as an exercise—indeed, this is unfortunately true of many subjects that are taught in the earlier years of our lives. That is the fault of the teaching system, of course, but in time mathematics in particular too often becomes a tiresome subject that awakens little interest and no enthusiasm. As Dr. G. H. Hardy once wrote: "Pure mathematics has no practical use; that is to say, it cannot be used for promoting directly the destruction of human life or for accentuating the present inequalities in the distribution of wealth." Many a young man, having studied sciences to a moderate standard, has chosen his career by noting which ones do not require mathematics; it has been suggested that that is one reason for the existence of so many organic chemists, medical men, and classical scholars.

It is recorded that Diderot, a foremost figure in the intellectual awakening which immediately preceded the French Revolution, was staying at the Russian Court, where he proved very popular. Some who did not care for the success of the foreigner commissioned Euler, at that time the first mathematician of his age, to debate in public with Diderot. Euler, for the purpose of this debate, claimed to have established a proof of the existence of God. With great gravity, Euler began: "$(a+b^n)/n=x$, therefore God exists. Answer that argument!" Diderot, unfortunately for himself, knew absolutely nothing about mathematics, and instead of giving the obvious answer that would occur to anyone who had reached even matriculation stage in that subject, he fled and was seen no more at the Russian Court. That is an amusing anecdote, but it is more; it is typical of the attitude of many people when they are confronted with even elementary mathematical symbols. A good deal of this is due to the habit of teaching what is known as "pure mathematics" to those who do not want to be pure mathematicians.

In pure mathematics we start with certain hypotheses, and from these we deduce certain conclusions; the truth or falsity of the hypotheses is not considered. Thus it is that Bertrand Russell has written that mathematics is a subject in which we never know what we are talking about, or

On Other Pages

whether what we are saying is true. All of which is very distressing for the young man or woman of a practical turn of mind.

It is thus with considerable pleasure that we have noted a report on the teaching of mathematics to physicists published by the Institute of Physics and drawn up by a joint committee of the Institute and the Mathematical Association. More mathematics are required by physicists than by chemists, but the idea is one that might well be developed in teaching all sciences where mathematics is of value. Some knowledge of mathematics is essential to every experimental physicist ; it provides the logic by which he can best develop his ideas, and the language in which his results can be most conveniently expressed. The problem is becoming urgent by reason of the increasing extension in content and technique of both mathematics and physics, and the same is true of other subjects. Yet, as the report says, " There are few ways in which men of high intelligence differ more than in their power to appreciate abstract mathematical reasoning." If a student's " mathematical ceiling " is unduly low, it is better for him not to adopt physics as his subject, of course, but the report recognises that the disinclination to study mathematics seriously, often disappears when once a student realises that the mathematics he is studying is of real use " as a means of expressing quantitatively the principles of his own subject and as a convenient medium for formulating and pursuing the physical analysis of his own problems." But the report recognises that " he has not the time, even if he has the sympathy, for the refinements which are the legitimate delight of the pure mathematician."

Acting on these principles, the committee has laid down courses for the teaching of mathematics to physical students. They are practical courses, in the sense that the branches of mathematics taught are those likely to be required by the student in his work, and are related to his subject. " From the point of view of the physical student, the mathematical analysis should run parallel to or, indeed, express the physical argument, and a problem should not be regarded as solved until the mathematical results have been re-translated into physical terms." This is equally true of engineering or chemistry. Again, " it must be admitted that, in the past, much of the time allotted to applied mathematics has been spent on the solution of problems in which the interest has resided mainly in the ingenuity of the mathematics. Problems have been propounded, not because they were important or even physically realisable, but because they led to ingenious, and perhaps unexpected, solutions. However admirable these may be in the training of the professional mathematician, they are out of place in that of the physicist, and may be omitted, not only without loss, but with positive benefit."

It is not necessary here to go into the details of the courses proposed. What is important is that the value of some mathematical training should be recognised and, further, that the training should be suited to the purpose in view. We should not surmise that any marked change in syllabus below, say, University Intermediate or Higher School Certificate stage would be necessary or desirable, but above this the teaching given should be such as to awaken the interest in mathematics as a tool to be used in the subsequent pursuit of the science in which the student expects to be employed.

A distinction has been drawn by Dr. Hardy between mathematics and useful mathematics. He gives, in *A Mathematician's Apology*, this list of " useful " mathematics. First, the bulk of school mathematics, arithmetic, elementary algebra, elementary Euclidean geometry, elementary differential and integral calculus. But he excepts a certain amount of what is taught to " specialists " such as projective geometry. In applied mathematics, he regards as " useful " the elements of mechanics. A fair proportion of university mathematics is also regarded as " useful," particularly that part of it which is a development of school mathematics with a more finished technique, and a certain amount of the more physical subjects such as electricity and hydromechanics. The bare minimum is a little dangerous and he would go a little farther in each branch than is absolutely necessary. " But our general conclusion is that such mathematics is useful as is wanted by a superior engineer or a moderate physicist . . . the great bulk of higher mathematics is useless," when useful knowledge is defined as knowledge which is likely in the near future to contribute material benefit of mankind.

NOTES AND COMMENTS

Research and Teaching

ADDRESSING the Senate at the opening of the academic year, the Vice-Chancellor of Cambridge University, Dr. T. S. Hele, Master of Emmanuel, spoke of the deep consideration that was required for the future responsibilities of the universities. He was not in favour of altering the functions or organisation of the colleges, and uttered a special warning against the overloading of colleges with research students at the expense of undergraduate students. Too great a proportion of graduates tended to focus the attention of the undergraduate on post-graduate research and to encourage him to specialise too soon. Dr. Hele envisaged an "outer ring" of research institutes, some as integral parts of the university, others, under their own governing bodies, linked to the university by the bonds of a common heritage and a common purpose. The vice-chancellor is wise in insisting that research must not occupy the attention of the university authorities *at the expense of* education. Teaching is, after all, the primary function of a university, and the don is often only too ready to bury himself in the technical aspects of his subject, to the detriment of his less advanced pupils. It was a wise move on the part of the I.C.I. authorities, when they offered Fellowships recently to the great universities, to make the provision that their Fellows should take part in the university teaching programme as well as in research work.

Central Design Council

THE Federation of British Industries has forwarded to the Board of Trade a memorandum containing proposals for the raising of the standard of industrial design in this country. The Federation considers it of first importance that improvement of industrial design should be encouraged and, with this object, has put forward proposals somewhat on the lines of those which have been so successful in promoting industrial research. The idea is that the Government should set up a Central Design Council, of not more than 12 members, to act as a centre of information, advice and propaganda, and that the various industries concerned should establish Industrial Design Centres to conduct research and development in regard to design, in co-operation with the proposed Council. The functions of the Council should include the organisation in London, at regular intervals, of exhibitions of articles of high quality and modern manufacture allied in category, to remain open to the public for approximately six weeks. The organisation of a Standing Exhibition (*i.e.*, continuously open though constantly changing) should be left for the consideration of the proposed new body when adequate experience and finance have been secured; and also occasional exhibitions should be held in London and elsewhere, including exhibitions for special trades or special purposes. Other suggested activities of the Council include: (i) the organisation of a section of the British Industries Fair to illustrate the best of current British design; to advise on the purchase of official furniture, and on training in industrial art; to conduct prize competitions and maintain scholarships; and to co-operate with the D.S.I.R., the British Council, the British Academy, the Royal Society of Arts, and other such bodies. Finally, it should aid individual industries in establishing Industrial Design Centres. We feel sure that the reaction of the Board of Trade to these proposals will be awaited with much interest.

A Peaceful Invasion

A FURTHER extension of the exhibition idea, with a view to a better understanding between this country and the peoples of the European continent, is advocated by Mr. Claude W. Bell, of Bell's Asbestos and Engineering, Ltd. As a result of his experiences immediately after the last war, Mr. Bell came to the conclusion that Britain was slow to make the impression on the Continent that it should have done. He has now issued a leaflet, entitled "Britain Invades Europe," embodying suggestions for the avoidance of a similar error this time. There is no doubt at all that our enemies will do all they can to spread misconceptions of our

national character and aims; and it is not by aloofness that we shall be able to counteract this. We must make every effort to see that Britain and the British are well understood throughout Europe. Mr. Bell's plan, as he puts it, is "to take Britain over there on pilgrimage"; and he urges that we must be quick about it. In concrete form, what he suggests is "exhibitions of the right type and on the proper scale in all the principal cities of Europe within 12 to 18 months of the cessation of hostilities," and he claims that these would be welcomed with enormous enthusiasm. Such exhibitions would not be "British trade propaganda" and nothing more—they must expound the message that Britain is a part of Europe. Obviously, as the author suggests, the energies of the British Council, the Department of Overseas Trade, and of Trade Associations and private enterprises of every type must be invoked—likewise those of the Dominion, Indian, and Colonial Governments. The exhibitions should include plays, concerts, books, sports, etc., as well as industrial material, and a section illustrating the full story of the war, which we alone can tell. At the very least the idea has, as its author claims, exhilarating possibilities.

The Location of Industry

IN view of the urgent necessity of securing universal employment, as nearly as may be possible, after the war, the question of the location of industry assumes an ever-growing importance. The wisdom of establishing area development councils as an initial step in this direction is therefore plain. In a future issue we propose to record in some detail a plan recently evolved for the post-war development of West Cumberland, an area that was classified as "special"—*i.e.*, depressed—during the slump of the 1930's. The initial spur behind the conception of this plan came from the very active West Cumberland Industrial Development Council. This area, however, was not the only one that gave serious cause for worry in the years before the war; the North-East Region was also a black spot from the point of view of unemployment. It is therefore encouraging to hear of a plan for the formation of a North-East Development Association, which, if all has gone well, will have come into being on October 6. Lord Ridley, the convener of the conference, as a result of which it is confidently expected that the new association will take shape, has explained the proposals in hand.

A Positive Plan

THE proposed new association is to be a more comprehensive organisation than the already existing Northern Industrial Group, and would represent all the diverse interests of the area. The organisation envisaged involves two main bodies—the new association to co-ordinate *all* activities in the area; and the Northern Industrial Group which would co-ordinate all activities connected with industry. It is hoped that the universality of the new scheme will cause the rivalry between different localities to be outweighed by consideration of the whole North-East as a single unit. One of its principal aims will be to press for the introduction of new industries, including light engineering, chemicals, and various light industries. One great advantage that these localised plans have over such general plans as have been put forward by the Government is that they are essentially *positive*. The official tendency has so far been to say that there are certain places where new works must *not* be established, rather than to investigate the suitability of certain areas for certain types of plant, and recommend them accordingly. Apart from anything else, this strikes us as psychologically unsound; even after five years of rule by "S.R. & O.," the British are still reluctant to submit to dictation; and a skilful presentation of the industrial advantages of certain areas would in the long run, we feel, carry far more weight than any kind of legalised blackmail.

A new wholesale distributing company in Johannesburg (Century Distributing Co., 30 Kerk St.), is pushing the sale of a number of South African chemicals, toilet preparations, drugs, and patent medicines. Yet another Johannesburg firm is producing a case-hardening compound put up in 1-lb. and 14-lb. tins and in 60-lb. drums, and also a brazing flux for welding brass, copper and bronze, and for brazing malleable iron and steel. This firm is also producing a floor polish.

Application of Alkaline Silicates—II

The Cleaning of Solid Surfaces

by P D. D, B.Sc., F.R.I.C.

(*Continued from* THE CHEMICAL AGE, *September 30, 1944, p. 320*)

SURFACE tensions of the solutions were measured by a modification of the capillary tube method and appear to be more regular than the contact angles.

Alkali	*Surface tension in dynes/cm.*
Liquid silicate 3.3 : 1 ...	55.4
Liquid silicate 2 : 1	62.2
Sodium metasilicate ...	64.41
Sodium sesquisilicate ...	64.15
Sodium orthosilicate ...	65.59
Sodium hydroxide	66.63

A combination of these values was made with those of the contact angles and for this the following equation was used :

$$w = - \frac{\text{Constant}}{E},$$

where w = wetting co-efficient, and E = the spreading co-efficient of the solution; the constant is the spreading co-efficient of distilled water and is 96.8. This, and the spreading co-efficient of the solution, are derived from the formula :

$$E = T (\cos \theta - 1),$$

where T is the surface tension and θ is the advancing angle of contact. These formulæ have been explained in previous papers by the author.[7] Using these formulæ, the following values are obtained for w :

Alkali	w
Liquid silicate 3.3 : 1	6.63
Liquid silicate 2 : 1	3.83
Sodium metasilicate	3.57
Sodium sesquisilicate	3.38
Sodium orthosilicate	3.11
Sodium hydroxide	2.52

The results plotted in Fig. 3 show the abnormality of the more siliceous silicates.

A further factor to be considered is that of the interfacial tensions of these solutions with other (non-aqueous) liquids. The lower the interfacial tension between two liquids, the more easily do they form an emulsion. These measurements were made against toluene, using a specially calibrated drop-pipette. The number of drops formed under given conditions for a given volume of the solution gave a suitable indication of the emulsifying power without further calculation. The following values were obtained for solutions equivalent to 0.5 per cent. Na_2O.

Alkali	0.228 c.c.	1.193 c.c.
Liquid silicate 2 : 1 ...	12	62
Sodium metasilicate ...	11	56
Sodium sesquisilicate ...	11	57
Sodium orthosilicate ...	12	65
Sodium hydroxide ...	9	45

There appears to be some irregularity in these values, particularly that of sodium orthosilicate. A further series of values was obtained for silicates, prepared by additions of caustic soda in solution to "liquid" silicate (2 : 1), and these were as follows :

Na_2O	SiO_2	0.228 c.c.	1.193 c.c.	equivalent to :
0.5%	—	9	46	NaOH
0.5%	0.25%	10	55	Na_4SiO_4
0.5%	0.33%	10	57	Sesqui
0.5%	0.5%	11	59	Na_2SiO_3
0.5%	0.75%	12	65	—
0.5%	1.0%	12	62	—

These values do not always correspond with the crystalline silicates in solution.

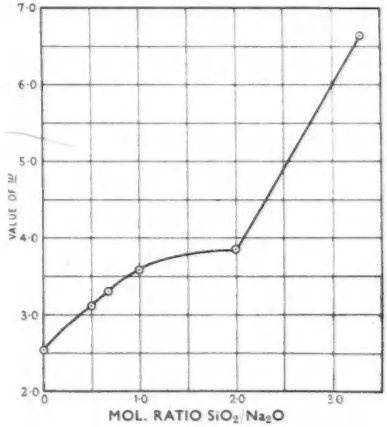

Fig. 3.

Thus the values for orthosilicate are lower when made in solution by this method than when the chemical compound is used. This would support the previous view that reaction of these two radicals does not occur quantitatively, but that some SiO_2 and Na_2O remains unreacting. Silica does eventually crystallise out from the mixture, and the excess of free Na_2O will bring the drop values nearer to those of caustic soda, which is lower than for the silicates. This tends to confirm the view that the stable form in solution is the orthosilicate, although it is not quantitatively formed. Similar remarks apply to sesquisilicate as for metasilicate.

Applying this information practically, it can be said that if it is required to have the alkalinity high (as is often the case in industrial cleaning operations), it is preferable to use sodium orthosilicate in its chemical form, rather than an equivalent product made up of more siliceous silicates and caustic soda. Apart from the inferior

emulsifying properties of the latter, the precipitation of silica is detrimental where moving machinery is involved.

Finally, adsorption is a surface-active effect which should receive consideration. Good adsorption often results in good deflocculation of a deposit, and, what is more, the stabilisation of the products in a colloidal form. The deflocculation of solids is equivalent to the emulsification of liquids. On the whole, the silicates are superior to the other alkalis as deflocculating agents. The initial penetrating of a deposit will depend upon the wetting power of the solutions, and it has already been shown that the more siliceous silicates are better in this respect. Having penetrated the deposit, adsorption on to the surfaces exposed will produce oppositely-charged surfaces which will repel and thus break up the deposit. In this case it may be the alkali ions which are adsorbed, and consequently the proportion of alkali must not be too low. This is confirmed in practice.

Three other factors now require attention, and they may seem diverse in their character. They are rinsing, sterilisation, and conductivity. The first applies to all forms of cleaning; the second mainly to the cleaning of food-containers and of plant cleaning, while the third is concerned with metal cleaning in the engineering industries.

Rinsing

Rinsing is essentially a question of dilution, but complications may arise when adsorption of the cleaning material on to the surface to be cleaned occurs. Thus, caustic soda is very freely soluble in water, and should easily dilute, but it becomes strongly adsorbed on to a glass or metal surface, and this proves a difficult factor in practical cleaning, for it is a notoriously poor rinser. The silicates are easier in this respect, particularly those which are less alkaline; but of the alkaline ones in solution, it is to be expected that a solution of chemical orthosilicate would be more freely rinsing than one of, say, metasilicate with caustic soda to give an equivalent of the orthosilicate, since the latter will have more free Na_2O.

Rinsing also introduces the factor of the dilution of emulsions. Oil or fats will be present on a cleaned surface in an emulsified form prior to rinsing. They will, of course, be oil-in-water emulsions and it is necessary that these emulsions are not broken on dilution, otherwise reprecipitation of the non-aqueous phase on to the work occurs. This sometimes does happen and may be due to one of two causes: (a) the emulsifying agent is not successful in low concentrations; or (b) the rinsing water is such that it destroys the emulsifying properties of the emulsifying agent. An acid rinse water would tend to break emulsions of this type, and hard waters may also cause this trouble. On the whole, the silicates are good rinsers, and maintain the stability of emulsions, particularly the more siliceous forms.[8]

Sterilisation

At first it might be assumed that the more alkaline silicates would be the better sterilising agents, since free hydroxyl ions do produce rapid death of organisms. In pure cultures of organism this is so, and in fact sterilising values are closely related to the *p*H of the solutions; but an important fact must, however, be considered. That is that the attempt to kill the organisms on the solid surface is not always (in fact, rarely) practicable. In some instances it has been found that resistant spores of organisms require periods for killing which are five or more times as long as that which is practicable in a given machine. The successful sterilising medium kills the organisms in the solution and not on the solid surface. Instead it removes the organisms from that surface rapidly and then kills them later in the solution. Hence, organism removal is closely linked with sterilisation of the object to be cleaned, and whereas the more alkaline silicates and caustic soda are slower to penetrate organic growths, the more siliceous ones with the lower surface tensions are more rapid and may be expected to remove the organisms more quickly. In practice it is necessary to compromise, having a solution of *p*H 11.0 or above, but as low a surface tension as is practicable with the method of cleaning adopted. In this respect the orthosilicate comes nearest to being the suitable material for this purpose.

Conductivity

Conductivity is a factor completely unrelated to sterilisation, but important in the field of metal cleaning. In this field electrolytic methods of cleaning are sometimes used, and the mechanical action of gaseous evolution at the metal surface reduces the time of cleaning. It is applied, for instance, in the removal of polishing compounds from metal surfaces prior to plating, and such like surface treatment. Direct current is usually employed, of low potential, generally about 6 volts.

Experiments were carried out with the silicates, using solutions of various ratios and adding caustic soda to the solutions. The conductivity was measured and plotted as amps. against the SiO_2 percentage. The graphs did not coincide for all the silicates as Fig. 4 shows. This can be explained only on the basis that the addition of caustic soda to a silicate does not produce the equivalent of the higher "chemical" silicates in solution. The surprising difference in the case of orthosilicate, in which the "chemical" silicate has a reading far below its equivalent solution, means that there is

far more free Na_2O in the latter, not apparently combined with the silica molecules. This was used as a method of distinguishing "mixed" silicates from the pure forms.

Similar results were obtained with alternating current; the method used was exactly similar to that with direct current, silicate solutions being made from the various silicates, all with an Na_2O content of 31 gm./litre. Two volts, A.C. current was employed, and the results are shown in Fig. 5. All these results confirm that there must be more free Na_2O in the "mixed" solutions and, since this is the case, there will also be free SiO_2.

Another phase in the conductivity of silicate solutions was also studied. It was noticed with direct current that there was a fall in the current passing with time. Steel electrodes were used for this experiment, using a current of six volts. A liquid silicate with a ratio of Na_2O to SiO_2 of 1 to 2 was first employed, a concentration of 12.5 per cent. of this material being used. This was equivalent to 2.25 per cent. of Na_2O. The fall is very rapid at first,

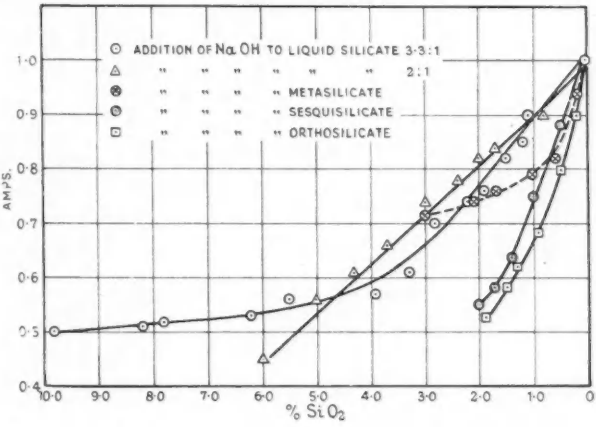

Fig. 4. Conductivity of Silicate Solutions. Direct current, 6 volts. *N* Solutions (3.1 per cent. Na_2O).

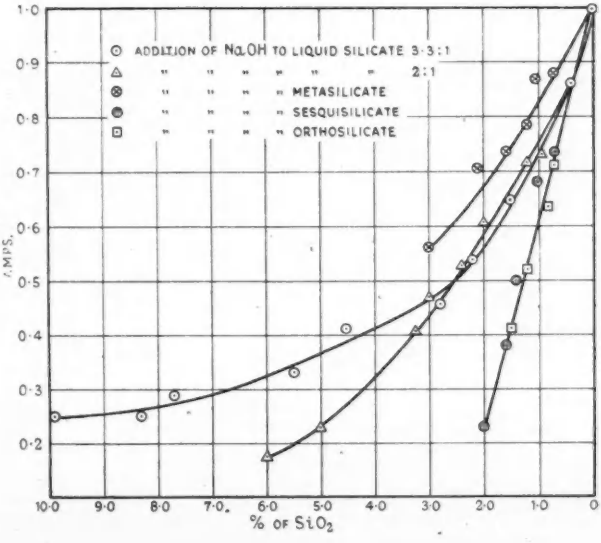

Fig. 5. Conductivity of Silicate Solutions. Alternating current, 2 volts. *N* Solutions (3.1 per cent Na_2O).

slackening off to a more or less constant value after about 25 minutes. This result is shown in Fig. 6, from which it will be seen that the value continued to be more or less constant at the end of 60 minutes. This constant value was about 1/8 of the original value at the beginning of the experiments. The test was repeated and after the value had fallen, the anode was removed and cleaned. It was then found that the current rose practically to the original value and then started to fall again. If the cathode was similarly cleaned during the experiment there was little change, the low current-reading continuing. It would seem that an anode deposit is formed which seriously affects the resistance of the cell.

The effects observed may be explained along the lines suggested by R. E. D. Clark.[9] He suggests that in certain types of colloidal solution, particles are drawn towards the anode and take up a position parallel to the anode, whereas particles drawn towards the cathode may take up a position at right angles to the cathode. If this is true, migrating ions would find it difficult to penetrate the parallel layers around the cathode. The deposit on the anode is probably one of hydrated silicate and silica micelles. Obviously, from this, cleaning of the anode would reduce the resistance, but cleaning of the cathode would have little effect.

A further experiment, using a mixed orthosilicate containing the same equivalent of Na_2O as in the first experiment, was carried out, and the result of this also is shown in Fig. 6. These results are important when electrolytic degreasing of metals

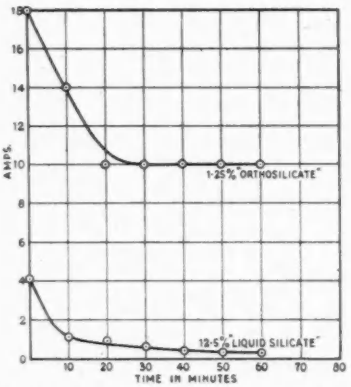

Fig. 6. Fall in silicate conductivity with time (6 v. D.C.)

comes to be considered. In this practice the mechanical action by the gaseous evolution is largely responsible for the cleaning of the work, and it will obviously be more vigorous with higher current densities. The latter will fall as the anode deposit builds up and this will reduce the efficiency of the electrolytic bath. For this reason silicates will be somewhat unsatisfactory for use in electrolytic degreasing.

Chemical Effects

Two chemical effects can be considered, one of which applies to the cleaning of glass surfaces, the other to the cleaning of metals. Observation tends to suggest the view that silicates have some surface action of a chemical nature on glass. When glass is washed in silicate solutions, it tends to have a more polished appearance than with other alkalis, and this may reasonably be accounted for by a base exchange at the surface of the glass. The calcium silicates in the latter react with the sodium silicate in the detergent solution, and this may have a polishing effect upon the glass, giving a greater degree of brightness than when other alkalis are used.

The second feature is the effect of silicate solutions upon different metal surfaces. There is little effect with iron, although it is known that iron silicates can form and these are to some extent protective. It has been found, for example, that traces of silicate in the final rinse water of a washing plant reduce oxidation of steel surfaces when drying. A more recent study of this problem tends to suggest the view that the fine particles of silica or some siliceous compound may act as a nuclei for the very even oxidation of the work, and that in fact a thin temporary protective film of iron oxide itself is formed over the work—too thin to be seen by the naked eye. This iron oxide may be ferroso-ferric oxide and it replaces the irregular and progressive formation of oxide deposits characteristic of normal rusting.

With non-ferrous metals the action of silicates varies. Copper alloys are usually attacked at the surface to give considerable discoloration, basic oxides and carbonates being formed. It is often necessary to use other materials with the silicate to overcome this problem, *e.g.*, cyanides, which dissolve these basic salts, or reducing agents such as sodium sulphite, which tend to prevent their formation. With tin, typical feathering usually occurs, but this can be overcome by removal of the oxygen from solution by the use of reducing agents such as sodium sulphite. Aluminium reacts with alkaline silicate solutions, but the silicate formed is protective and prevents further action upon the work. Thus it must be carefully controlled, since it is possible to build up a heavy and unsightly white deposit upon the work, but under certain conditions it is possible to clean the work in silicate solutions without any apparent action on the surface of the metal. In this case a fine

adherent silicate film is formed over the surface and this is protective.

Advantages in Industrial Cleaning

Two important fields of cleaning are considered, namely, that of the cleaning of glass surfaces and that of the cleaning of metals. We can summarise the general cleaning advantages of silicates over those of the other alkalis and these in the main refer to both fields of cleaning.

(1) More rapid wetting than with other alkalis, due to lower surface tensions. This will be important in the wetting and penetration of fatty and oily layers such as those of milk in glass bottles and of machine oil on metal parts.

(2) More rapid emulsification and greater stability of the emulsions on dilution, as a result of lower interfacial tensions. Again, this advantage will be seen where oils and fats are to be emulsified and held in stable emulsion, especially in subsequent rising.

(3) The deflocculation of deposit is likely to be more rapid with increased rate of penetration. This, however, is also linked up with the formation of repellent films in the interstices of the deposit, and these appear to form more readily with more alkaline materials. Hence, it is necessary in this case to compromise between the rapid penetration of the less alkaline materials and the more rapid splitting of deposits by the more alkaline materials. This factor is likely to be of importance in the penetration of glues and label deposits on bottles, and polishing compounds on metals.

(4) The colloidal micelles which form have a mechanical scrubbing action, a great advantage in cleaning over true solutions.

(5) Good buffering is to be found, and this will result in long life of the solutions.

(6) With a hard water the deposits formed are often of the nature of a colloidal sludge and not of the crystalline adherent form so often obtained with other alkalis. The sludge is generally free-rinsing and will not form a film upon the glass or metal surfaces or give rise to heavy deposits in washing machines.

(7) Rinsing, particularly with the more siliceous silicates, appears to be better than with caustic soda.

(8) The possible base-exchange property of glass surfaces gives a cleaner appearance to the glass.

(9) The protective effect on certain metals is an advantage.

Some Difficulties

Certain difficulties must be taken into consideration and these can be summarised as follows:

(1) Many of the improvements to be obtained with the more siliceous silicates bring about adverse conditions as a result of the lower hydroxyl ion concentration. This has been noted above when considering deflocculation; other factors such as sterilisation must also be taken into consideration.

(2) The addition of the more siliceous silicates to caustic soda may bring about the precipitation of silica. This has been known to cause the seize-up of moving parts in washing plant, more particularly when softened water is being employed, *e.g.*, in machines washing milk bottles; it has been suggested in this case that free lactic acid of the milk residues removes some of the Na_2O, thus precipitating the silica. The fact that the problem is not so pronounced where hard waters are used, may be accounted for by the reaction of the calcium and magnesium salts with the active silica released to give the appropriate silicates, thus preventing the formation of iron silicate deposit upon the moving parts of the machinery. The use of "true" silicates in solution may overcome this problem entirely.

(3) The fall in the conductivity of silicate solutions shows that they are not wholly suitable for use in electrolytic degreasing.

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New London Professorship

Chair of Concrete Technology

WITH the approval of London University, a chair of Concrete Technology is to be instituted by the Imperial College in its City and Guilds College. This has been made possible by a recent benefaction from the Cement Makers' Federation. The Chair will be instituted, in the first instance, for ten years, and will be attached to the Department of Civil Engineering.

The duties of the professor—who may not be appointed until after the end of the war with Germany—will be to provide advanced instruction in the principles and technological application of reinforced concrete, to conduct research, and to consult with industry regarding the practical experience which they will give to students. In order to establish contacts with industry, an advisory committee is contemplated.

A noteworthy feature of the scheme is an arrangement, sponsored by a number of building and civil engineering contractors, whereby bursaries will be made available to students devoting one or two years to an intensive study of concrete technology.

Personal Notes

MR. J. STEWART COOK, hon. secretary of the London section, British Association of Chemists, has been selected as Labour Candidate for the Henley division of Oxfordshire at the next general election.

MR. ARTHUR F. THOMPSON, of South Hetton, Co. Durham, has won a Miners' Welfare National Scholarship, tenable at the Imperial College of Science and Technology, London, for an honours degree course in chemical engineering.

COL. BRADLEY DEWEY, former United States rubber director, has been chosen by the American Section of the Society of Chemical Industry to receive its Chemical Industry Medal for 1944, for work in colloid chemistry.

MR. J. STANLEY HOLMES, M.P., chairman and managing director of Beechams Pills, has been appointed chairman of Veno Drug Company, Beecham Maclean Holdings and Prichard and Constance (Mfg.) in succession to the late Mr. Philip E. Hill.

MR. GERALD LIGHTFOOT, secretary of the Australian Council for Scientific and Industrial Research since its inception in 1926, is retiring under the age-limit rule, but will continue with the council in a part-time capacity. The new secretary is Mr. G. A. COOK, previously assistant secretary and head of the council's information section.

The following presentations were made at the general meeting of the American Chemical Society recently held in New York. MR. ARTHUR C. COPE received the American Chemical Society award in Pure Chemistry, while the Priestley Medal was given to PROFESSOR JAMES BRYANT CONANT, Harvard University, who, for his medal address, chose the subject "Science and the National Welfare."

MR. IVOR PAUL LLEWELLYN, M.B.E., M.I.Chem.E., has been elected to the Widnes Town Council as member for the Farnworth ward. Mr. Llewellyn has been a director of Peter Spence & Sons, Ltd., since 1916, and has served with that firm for about 50 years. He is hon. treasurer of the Association of Chemical and Allied Employers (on the executive board of which he is a member of long standing), and he is on the Chemical Trade Joint Industrial Council.

Obituary

MR. SYDNEY H. RAWLINGS, joint managing director of The Automatic Coil Winder & Electrical Equipment Co., Ltd., died on September 18, aged 64. Cremation took place at Cambridge on September 20, and a memorial service will be held at St. Stephen's, Rochester Row, London, S.W.1, at 11 a.m. on October 12. Mr. S. H. Rawlings founded the firm in 1923, and was joined three years later by Mr. B. G. Donne, who, with Mr. Jack Rawlings, will carry on the company's policy unchanged.

Chemical Workers' Union

Post-War Programme Adopted

IMPORTANT provisions of the post-war programme submitted by the executive and adopted at the conference of the Chemical Workers' Union in London last Sunday, include demands for: (a) an effective share in controlling the industry through standing joint committees to deal with production and efficiency questions only; (b) the employment of union labour; (c) a six-hour day without loss of pay; (d) specified overtime and night duty rates; (e) equal wages for equal work; (f) improvements in health protection and workers' welfare; and (g) holidays with pay. A resolution was adopted approving a ballot of the members for creating a political fund.

Mr. Bob Edwards (Lancashire) urged that it would be a mistake for the union to line up with the Labour party, because there might be an entirely new grouping of political parties. At the previous day's session, Mr. Edwards declared that science had been sabotaged and technical inventions and new materials withheld because of secret agreements between big business men who created an artificial shortage. He was moving a resolution calling for a Government inquiry to ascertain how far those international arrangements were against the best interests of the community. He alleged that the production of magnesium was deliberately restricted in Britain because of international agreements, and that caustic soda had been kept off the market and even destroyed when it was in short supply.

The Celanese Corporation of America is building a synthetic rubber plant at Bishop, Texas, using the aldol process and employing petroleum gases as raw material. It will have a capacity of 10,000 tons of butadiene annually and is expected to come into operation early next year, reports *The Financial Times* from Washington.

Production of glass cups and tumblers from glass scrap collected all over the country was begun in Khartoum. Output has been running at several hundreds of glass coffee cups and tumblers a day. Present supplies of glass in the Sudan may not last longer than a year and investigations are being made to see if sand suitable for glass manufacture can be found in the country. It is likely that sand from the Red Sea Hills will be usable, in which case the Khartoum factory will increase its output.

Metallurgical Section

Published the first Saturday in the month

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Nitrogen Surface-Hardening

Developments of Ammonia Processes

by A. G. AREND

NITRIDING of steels probably represents the most widely developed system of surface-hardening since hardening processes were first introduced, because of the resistance to aging and general high-class wearing qualities obtained. This not only applies to larger machine parts, such as gears, crankshafts, ribbed cylinders, etc., but to almost all classes of precision automatics, where the smallest grooves and notches must be maintained without even the slightest deterioration. In one instance it was claimed that no measurable wear was experienced on a nitrided automobile crankshaft after it had been running some 60,000 miles.

Many of the inherent errors experienced in case-hardening, such as the formation of a coarse granular structure in the surface zone, and distortion, are absent when nitriding is substituted. While most of these developments relate to the use of nitrogen derived from ammonia gas by different processes, it is only fair, in justice to the alternative system of immersing the parts in molten cyanides, to point out that no really intensive study of this latter method appears to have been carried out (but *see* p. 349).

Among the most widely used processes of applying nitrogen gas at the present time are those of Chapman, U.S.A., and of Krupp, Germany, although there are a number of others operated on similar lines.

The Chapman Process

In the Chapman process, which is operated in two steps, the parts are first prepared for the nitrogen impregnation, by placing them in a container, able to withstand the effects of the temperatures to be applied. The parts are carefully spaced and separated by layers of copper gauze, after which the container is accurately sealed and placed in the furnace. Connections are then made for the inlet and outlet of gas to the container, while it is still within the furnace. Before introducing the ammonia gas, it is first passed through a pressure-reducing valve into a scrubber, wherein the ammonia is cleaned. All traces of moisture are then removed from the gas by passing it into a drying tower, containing a dehydrating agent, whence it is passed into a cracking still, where it is partially broken down to hydrogen and nitrogen. This breakdown is completed by passing the gas into a catalyst; it is now ready to enter the receptacle containing the steel parts. The gas is allowed to pass through the retort for several hours because of the necessity of removing all traces of air. The temperature is then raised to 370°C. and the action continued. The time depends upon the amount of material to be handled.

In the second stage of the process, the gas is by-passed from the cracking units into an ioniser, where ammonia is being broken down to provide nitrogen in the nascent state; this is being done by means of a corona, using high tension of 15,000 volts, with extremely low intensity (less than 0.5 amp.). The activated gas is then passed in to react with the steel. In the case of stainless steels, the temperature is being raised to 565°C., and the material is kept under the action of the gas for a period of time according to the depth of case, while by means of dissociation pipettes the dissociation is determined at regular intervals.

The Krupp Process

In the Krupp process, all parts to be treated are completely machined and annealed to relieve them from internal stresses, employing an electrical resistance furnace with automatic regulation. The steels used are selected from those which will give satisfaction in respect of the demands of nitriding only, by alloying them with varying proportions of chromium, molybdenum, vanadium, and aluminium. According to Dr. Kruse (1939) the parts are heated to approximately 500°C. in an atmosphere of ammonia gas for from 5 to 90 hours, the time depending again on the depth of case which is required. What nitrogen is split off from the gas penetrates or diffuses into the surface of the steel where it forms nitrides, or rather metal-nitrogen compounds, and upon completing the process, the parts are cooled in the air in their box. The treatment produces an extraordinary in-

crease in hardness in the surface zone because the nitrides are insoluble in the iron base metal. However, contrary to the ordinary case-hardening, where steam or air bubbles may form at specific locations, thus preventing adequate hardening and the desired measure of uniformity, the whole surface absorbs nitrogen.

Nitriding Crankshafts

In respect of crankshafts, it is nowadays recognised that their length of useful service is as much dependent upon their resistence to wear and their running properties, as upon their dynamic and static strength, and frequent use is made of crankshafts in heavy duty engines with hardened journal surfaces. The effect of nitriding is most pronounced where the stress is higher in the case than in the core, such as tension in the presence of a notch, or in bending. In earlier years, details of the Krupp process were given in *Techn. Mitt. Krupp*, 1933, No. 2., which appear to have since been improved considerably, and also in the original work of Haufe and Bruhl in *Maschinenbau*, 1931, *10*. In more recent years, Bardgett in *Metal Treatment*, Summer issue, 1943, *10*, gave particulars of the influence of nitriding on fatigue strength, summarised below.

The limiting fatigue stress of plain specimens of chromium-molybdenum steel, containing 3 per cent. chromium, heat-treated to provide 67 to 70 tons/sq. in. tensile strength was raised by nitriding by 36 per cent., and that of notched specimens by 300 per cent., while the corresponding figures for the material heat-treated to provide approximately 84 to 86 tons/sq. in., were 20 and 189 per cent. The notch sensitivity of the metal, treated to either of these two ranges of tensile strength and nitrided, was found to be of a small order, and here again the advantages of nitriding were found to be less for the material of higher tensile strength.

The influence of an increased depth of case from 0.0155 to 0.020 in. on limiting fatigue strength was found to be negligible, but it was ascertained that greater hardness without alteration in depth of case lowered the value for the limiting fatigue stress. The paper also gives a typical set of direct stress test and bending-fatigue test results, using a chromium-molybdenum steel (3 per cent. Cr.), containing vanadium, which was heat-treated to a tensile strength of approximately 90 tons/sq. in.

The conclusions drawn from investigtions made by the Institution of Automobile Engineers, described in *Engineering*, 1942, *154*, were that, provided that the stress gradient and/or stress-concentration were insufficient to cause failure to start from the surface of a nitrided specimen, the decrease in limiting fatigue stress with increase in stress-concentration would be less than that of an un-nitrided steel. Where these properties were such that failure started from the surface of the nitrided specimens, the decrease in limiting fatigue stress, with increase in stress concentration, was greater than that of an un-nitrided steel, but this latter quality with nitrided steel was still appreciably higher than that of steel not subjected to nitriding treatment. It was claimed that the incidence of fracture from the surface of nitrided specimens did not necessarily indicate a low limiting fatigue strength. Accordingly, notch-sensitivity, as measured by the loss in fatigue strength due to a notch, might be low in a specimen showing fractures starting from the surface. In the foregoing papers references are made to the fact that the effects of corrosion on fatigue strength are markedly reduced as a result of nitriding, and some examples are quoted, which largely follow what was previously given by A. Junger in a publication on sea-water corrosion (*Mitt. Stahl. Forsch.-Anst.*, 1937, No.1). Different classes of nitrided surfaces appear to have been exposed to the same type of salt-spray corrosion, which confirms that ordinary case-hardening cannot assure adequate protection.

Selected Alloy Steels

It has been stated that un-alloyed steels cannot be really successfully nitrided because the absorption of nitrogen does not induce the necessary perfect surface hardening; this led to the claim, made immediately before the war, that Krupp's steels were responsible for the headway made. By the addition of molybdenum, vanadium, and aluminium to chromium steels, metal for nitriding could be applied with a tensile strength of core ranging from 40 to 85 tons/sq. in., which, in the light of recent researches in the U.S.A., is scarcely justified, because in the latter country this range has been extended further Nitrided parts offers special advantages for the design of water-pump shafts for motor vehicles, gears, reference masters, thread and ring gauges, valves, limit plug gauges, etc. Even the most difficult sections may be successfully nitrided, while the use of alternative methods led frequently to innumerable rejects. With reference to crankshafts, which are to-day rapidly forged, using the counter-stroke principle, and machined, this means of hardening the surface has special advantages, which apply also where hot-pressing, drawing, and rolling are used. The possibility of the hard external layer cracking and peeling off is dissipated because of the gradual transition of the nitrided outer zone into the soft core. As any latent stresses present would be released and might induce inadmissable distortion, annealing is performed before

machining and nitriding, while the very small increase in volume, consequent upon the absorption of nitrogen, can usually be ignored.

In cases where absolutely accurate dimensions are demanded, such as with plungers, spindles, and other fine parts, there is no alternative but to grind off the surplus metal after nitriding, but the total removed seldom exceeds more than a few thousandths of an inch. A great deal of research is being devoted to ascertaining the depth of the nitrided layer, its hardness, its toughness, the strength of the core material, and the transition between the core and the nitrided layer. The machinability of the metal is of importance because some protruding parts require to be finished after nitriding, and, to facilitate this, they can be tinned to protect them from hardening. It is claimed that, by making adequate allowances, even the very slight increase in volume of the external layer can be offset, as the extent of nitrogen absorption follows an exact law, although, as a rule, finish-machining is finally resorted to. The actual *modus operandi* of nitriding is not complicated, but the control of the depth of penetration for acquiring specific physical characteristics and disposition with different alloy-steel cores and surfaces, renders it a large, but not necessarily complex study.

Liquid Nitriding

The Cyanide Bath Process

BY liquid nitriding, surface hardness of hardened high-speed steel tools can be raised from 850 to 110 Brinell, and in the "hard surfacing" of such tools, liquid or cyanide nitriding has its most extensive application. Its purpose is the creation of a surface considerably harder than that obtainable by the usual heat treating procedures. The same result might be obtained by gas nitriding, which, however, involves the danger of making high-speed steel tools brittle. In contrast to gas nitriding, which employs ammonia gas, in liquid nitriding molten cyanides are used to supply the nascent nitrogen. While in gas nitriding comparatively deep cases of about 0.625 in. (0.64 mm.) are obtained, in liquid nitriding the depth of the case may vary from several ten-thousands to about 4/1000 in. (several 1/400 mm. to 1/10 mm.).

The nitriding bath usually applied is composed of a mixture of 60 per cent. sodium cyanide and 40 per cent. potassium cyanide by weight, roughly approximating to the eutectic mixture. Different nitriding mixtures may be prepared consisting of cyanides, carbonates, chlorides, and fluorides of sodium, potassium, barium, and calcium, in order to obtain a cyanide-containing salt mixture with a melting point below 500°C. A freshly prepared nitriding bath must be aged for 12 to 16 hours at about 566°C. to avert brittleness of the nitrided steel tools. Aging may be speeded up by using a nickel-chromium alloy pot, instead of a pressed steel pot. Provided that the bath is thoroughly aged and its cyanate content sufficiently high to insure a melting point below 427°C., liquid nitriding may be carried out at temperatures between 454° and 621°C. The higher the bath temperature, the faster and deeper the nitrogen is absorbed. The temperature usually employed is 566°C. Temperatures in the neighbourhood of 48°C. are employed for gauges, to keep distortion at a minimum. With the continued use of the bath, the cyanide content decreases and that of the cyanates and carbonates increases. As the cyanate content increases towards the upper margin of the good range for nitriding of 8 to 15 per cent., the melting point of the bath decreases to 413°C. and lower, and the bath has to be replenished by additions of cyanide.

Maximum surface hardness as a result of liquid nitriding at 566°C. may be obtained after 2 or 3 hours immersion-time. Continued immersion results in an increase in case depth, but a decrease in surface hardness. As a consequence of a sacrifice in toughness owing to the increase in hardness, extremely hard high-speed steel tools, which are nitrided to relatively great depths, become increasingly susceptible to cracking of the case, if they are roughly ground. All high-speed steels, whether molybdenum-vanadium, tungsten molybdenum-vanadium, cobalt or other types, may be nitrided by the liquid method. However, there are tools which are not sufficiently improved by liquid nitriding to warrant its application.

CANADIAN BASE METALS

The Dominion Bureau of Statistics recently issued its annual report on non-ferrous smelting and refining in Canada in 1943. According to this document, production of zinc of the Consolidated Mining and Smelting Co. of Canada, Ltd., showed a substantial reduction due to a falling off in ore receipts from the Sullivan mine. On the other hand, tonnage of ore milled, and production of blister copper and slab zinc by the Hudson Bay Mining & Smelting Co., Ltd., were the highest of any year on record. Cadmium production reached a record level, since stockpiles of residues were depleted and production depended solely on treatment of current zinc purification residue. Production of refined lead amounted to 224,493 tons, or 19,000 tons less than in 1942. The antimony plant was closed for a time, due to a shortage of labour; antimony output, therefore, totalled only 557 tons during 1943.

American Chrome

Supply and Production Problems

THE use of Turkish, Russian, Canadian and domestic, mainly Montana, ores, if ample supplies of Transvaal ores are not imported from South Africa for the production of chromium chemicals, was discussed by the advisory committee of America's producers of primary chromium chemicals. Transvaal ores, now used exclusively for the production of chrome compounds, may not be available in adequate quantities during the coming months on account of the shortage of shipping space. Production problems due to the varied ore content and price readjustments requiring additional subsidies are the obstacles that would probably be encountered in a switch to alternative ores. In order to eliminate production bottlenecks, the Chemicals Bureau has installed improved equipment in many plants. It is expected that this will result in an increase in output by 10 per cent. in 1945. Five of the six existing plants have arranged to use Russian ore, which has a higher chrome content. Approximately 87 per cent. of all chrome compounds produced are used for military purposes, such as the manufacture of pigments for camouflage, the tanning of military leather, and plating and anodising in aircraft production. The remainder is available for civilian needs.

U.S. ORE DEVELOPMENTS

The U.S. Geological Survey has published several reports on recently investigated ore deposits. **Manganese deposits in** central Virginia were studied and mapped by geologists of the Survey's staff. Copper-bearing iron deposits of Alaska were also investigated. This area contains some very large magnetite deposits, estimated to contain about 2,232,000 tons of indicated ore and about 1,200,000 tons of inferred ore; they range in grade from about 40 to 62 per cent. iron and average about 50 per cent. They contain from about 0.05 to 1 per cent. of copper and up to 4 per cent. sulphur.

The Reward mine, the largest copper producer in the Casa Grande mining district of Arizona, was investigated as part of the emergency war programme. This property, which produced copper between 1885 and 1929 has again attracted attention because of outlying copper-zinc deposits, discovered during the early explorations, but never fully prospected. The workings, and a considerable area in the vicinity, have now been mapped in detail, and a programme of trenching and drilling has been carried out.

Corrosion Committee

U.S. Clearing House for Information

A CO-ORDINATING Committee on Corrosion has been founded in America, under the chairmanship of Frank L. LaQue, of the International Nickel Company, with headquarters at 4400 Fifth Avenue, Pittsburgh. It is to serve as a clearing-house for information on American experience and work in progress in the field of corrosion and corrosion-prevention, and to act for the exchange of such information and experience with foreign agencies such as the Corrosion Committee of the British Iron and Steel Institute. Six sub-committees have been formed: (1) to co-ordinate studies on under-water paints; (2) to co-operate with the British Admiralty Marine Corrosion Committee; (3) to examine and approve applications for grants-in-aid from the research fund offered by the American Society for Metals for the support of fundamental research on corrosion; (4) to standardise corrosion-testing materials; (5) to standardise corrosion symbols; (6) to advise the Navy's Bureau of Ships on special problems as required.

The committee is at present composed of official delegates from seventeen learned societies and other institutions in America, including the American Institute of Chemical Engineers, the American Society for Metals, the American Society for Testing Materials, the Electrochemical Society; the Armour Research Foundation, Battelle Memorial Institute, and Mellon Institute; and the National Bureau of Standards.

According to a recent report from Peru, the erection of a 125-ton flotation plant on copper properties in the Department of Ancash was completed in March and the production of copper concentrates was begun. Equipment was being installed at the large zinc mines near Ticlio, Department of Junin, and equipment had arrived for the 150-ton flotation plant in Huancavelica. Construction of the 200-ton acid leaching plant for vanadium ores is nearing completion.

Fluorspar for Steelmaking

The Supply Position

IN a memorandum to fluorspar consumers and producers, the Ministry of Supply announces that the fluorspar supply position in Great Britain is generally satisfactory; in fact from now on it is not unlikely that availability will exceed demand. This is particularly satisfying when it is recalled that two years ago, when fluorspar came under statutory control, supply was quite inadequate and the outlook precarious.

When the Control was first imposed, a survey of the producing elements was made, and it was proved that increased production was essential. Most of the fluorspar then being produced was from hillocks of waste deposited by the old lead miners. Since the richest dumps had naturally been the first to be worked, the reserves, as well as being much depleted, were producing low-grade material, deficient in calcium fluoride, and abundant in silica and other impurities. It may be stated that in the days of critical supply, much of the material offered to steelworks was of such poor quality that it probably gave little, if any, aid to furnace operation.

Augmented Production

The Ministry's appeal for more fluorspar met with a most encouraging response, and steelmakers in particular have every reason to be grateful to producers. It was clear both that existing production had to be augmented, and that in order to meet the increased war-time demand and to ensure the maintenance of future supplies, producers had to be encouraged to develop the considerable underground deposits that were known to exist. Great courage was required to embark upon such development. Preliminary costs were heavy and unproductive, and all the uncertainties of underground development had to be contended with. Furthermore, although the quality of mined and processed spar was certain to be consistently higher, the final costs of production would be much greater. It was known that steelworks were keen buyers, and their attitude towards higher quality was uncertain. During the period of short supply there was no risk, but the planning of fluorspar mining could only be on a long-term policy basis.

However, the requests and encouragement of the Ministries concerned decided several producers either to commence (or increase) mining development, or to instal equipment for processing and beneficiating hillock material. The result has been that no consumer has been short of fluorspar and average quality has been improved. Subject only to the condition that consumers will continue to encourage the efforts of the miner and processor, the country's requirements can be guaranteed for many years to come.

It is an unfortunate fact that there exists no definite and generally accepted code for the use of fluorspar in steelmaking. In the absence of precise specifications of quality from the melting-shop and because of the doubtful and varying material often supplied by fluorspar producers, buyers, not unnaturally, were often compelled to buy on price alone, although this practice is changing.

In order that production and supply problems may be dealt with in the most efficient manner, the British Fluorspar Producers' Association was formed, of which more than 90 per cent. of producers are already members, and it is expected that membership will shortly represent all actual producers of fluorspar. The Association has been voluntarily formed and is in no way sponsored by the Control or any other Government department. It was, however, the duty of the Control to follow the progress of this body, and, as it is at present constituted, the Ministry is satisfied that its aims are in the best interests of both the producing and consuming industries, and deserving of full support by all concerned.

Grades and Prices

The British Fluorspar Producers' Association has now issued a statement which gives details of the grades and prices that apply from October 1, 1944, and the names and addresses of those producers who have undertaken to conform to them.

To assist production programmes, the Ministry of Supply (Chrome Ore, Magnesite, and Wolfram Control) will, while the supply position remains favourable, issue licences for periods of six months. The next issue is for the period October-March, and applications should be submitted at once.

Prices of fluorspar per ton f.o.r. are as follows: *Derbyshire and Yorkshire*, graded (over 60 per cent. CaF_2), 52s. 6d. to 90s. according to CaF_2 content (minimum) and SiO_2 content (maximum); ungraded, 30s (60 per cent. CaF_2 and under) or 40s. (over 60 per cent.; *Durham*, graded 65s. to 90s. ungraded (below 75 per cent. CaF_2), 50s.

A new iron mine has been discovered near Chemin, above Martigny (Valais) Switzerland, and extraction of the ore (which has a 66 per cent. iron content) has already started.

The Royal Ordnance Factories

What of the Future ?

(from a Special Correspondent)

IN all the extensive discussion of post-war planning which has figured so prominently in Parliament and press, little or no mention appears to have been made of the potentialities of the factory organisation owned and operated by the Ministry of Supply. Nothing comparable to this vast production machinery comprising about sixty large factories and employing upwards of 400,000 people, existed in this country during the last war and its post-war utilisation is a completely new problem demanding immediate consideration.

Before discussing possible post-war developments, the nature of this organisation may be indicated. On the engineering side, ordnance of all calibres is produced, together with the requisite ammunition. Forging capacity, heat-treatment plant and machine-tool equipment is available for everything from 16-inch guns downwards. Foundries, rolling mills, strip mills, annealing furnaces and press shops are already established for the production of shell and cartridge cases. On the chemical side there is extensive plant for the manufacture of the mineral acids (sulphuric and nitric), for ammonia synthesis, and for the production of explosives.

National Security

In the interests of national security a certain percentage of this plant must be retained for ordnance manufacture. The lead gained by Germany in the development of weapons operated by jet and rocket propulsion opens up terrifying possibilities and challenges us in this country to produce and perfect both corresponding and counteracting measures. In the Ordnance Factories the Government have already in existence the plant and skilled personnel to undertake such essential development. Assuming, however, that this work is undertaken on an adequate scale, the problem of the utilisation of the remainder of this factory organisation still exists. (Our scrupulous regard for the provisions of lease-lend material does not bind us to any extent in this connection, as by far the greater part of the plant and machinery employed in these factories was bought and installed some considerable time before the introduction of this beneficient piece of American legislation).

Hitherto, the declared policy of Ordnance Factories has been to avoid competition with private enterprise in the manufacture of anything other than ordnance. Various small orders have been executed at odd times for the manufacture of other items (*e.g.*, bicycles for the G.P.O.) for Government Departments. As the Government is committed to a policy of building and retaining the ownership of 300,000 temporary houses, why should it not maintain the Ordnance Factories to manufacture the fittings required—wringers, washing machines, sewing machines, refrigerators, vacuum cleaners, and bathroom fittings—all required by the thousand to equip these dwellings. Orders of this type could be undertaken by the Ordnance Factories and would provide work for several years.

Essentially these factories are owned by the people of Britain, whose labour and money built and equipped them at amazing speed in times of dire stress to produce the needed weapons of war. Is it not just that in times of peace these factories should be switched over to furnish their essential owners, the working population of this country, with the means to a fuller and happier life—one comparable to that enjoyed by their fellows in the Dominions, and in the United States of America? Will not the Government make a bold move by turning over a percentage of the factory capacity NOW to produce components for the temporary houses?

The Chemical Side

On the chemical side the problem is a bit more vague and developments would have to be correlated with national schemes for coal utilisation and the harnessing of hydro-electric power. What is beyond doubt is that the Government is now in possession of more than the nucleus of a chemical engineering industry capable of organisation and development on a national basis and permitting wise and efficient utilisation of our resources of coal and water power. For the hydro-electric power schemes, these factories producing heavy guns could equally easily furnish the rotor shafts and other heavy machinery for the turbo-generators.

Two main lines of development in chemical industry are already patent to any qualified observer—in the development of plastics and synthetic resins and the production of synthetic rubber. Along both these lines the United States of America are already forging ahead with great strides. Should not every endeavour be made to enable British products to compete in world markets? Chemicals produced from coal constitute the basis of the plastics and synhetic rubber industries. The manufacture of Neoprene synthetic rubber, of Buna-N rubber, and of the group of plastics based on vinyl chloride is founded on acetylene. Acetaldehyde, acetic anhydride, and acetic acid, so exten-

sively used in the rayon industry, are also produced from acetylene. By linking up national hydro-electric power schemes with an efficient utilisation of our anthracite coal reserves, calcium carbide may be produced in large quantities by electric smelting, so providing the acetylene required. Benzene, recovered as a gas and coke-oven retort by-product, is the essential starting point for the manufacture of Buna-S rubber. Water-gas produced from coke, anthracite, or bituminous coal may be employed in the synthesis of formaldehyde, methyl alcohol, and formamine, the last constituting the basis of acrylonitrile and methacrylate resins.

The combination of cheap hydro-electric power from national development schemes together with the scientifically controlled exploitation of our coal reserves will provide a secure basis for a chemical industry in this country exceeding anything at present in existence. No one would suggest that the entire chemical industry of the country should be nationalised; but there is, however, a very strong case for using the existing organisation in the Ordnance Factories to supplement and increase the production of chemical raw materials (for which they are already well equipped) and to carry out the development and pilot-plant work along some of the lines indicated earlier.

On a long-term policy there are two other lines of research and development work which could be carried out most usefully by this organisation. First, the development and testing on pilot plant and semi-scale plant of representative processes for the conversion of coal into oil. Such a recommendation with reference to the Fischer-Tropsch process was made several years ago in the Falmouth Committee Report. Conversion of coal into oil is unquestionably one of the necessary developments of the next half-century as the supplies of natural oil diminish. Also outstanding as a means of partly recovering the values from our thin coal seams is the introduction of underground gasification. Only in Russia has this novel idea been adequately exploited, but there should also be a wide field in this country. In old workings with thin seams or broken coal in dangerous ground gasification *in situ* should be developed. Russian experience indicates that the bulk of the tar and oils and substantially all the gas are recovered. Obviously, the possibilities are very great and some organisation on a much larger scale than the laboratories is required to exploit them. Such an organisation already exists. Will the Government adopt a bold and progressive policy making possible industrial advances on the chemical side and leading to an improved standard of living all round and the prospect of increased ability to compete in world markets, or must this great and in many ways highly efficient organisation be allowed gradually to disintegrate with hundreds of thousands of workpeople thrown on the labour market in the critical post-war period?

MANCHESTER LEATHER CHEMISTS

At the meeting of the Manchester Group of the British Section of the International Society of Leather Trades' Chemists held on September 30 at the Engineers' Club, Manchester, the I.C.I. film, "This is Colour," was followed by Dr. E. G. Cockbain's paper on "Some Physico-Chemical Aspects of Tanning and Dyeing Processes."

An outline was given of the physical and chemical properties of collagen fibre which are most important in influencing its reaction with tanning agents and dyestuffs. The various means of combination of vegetable and chrome tanning agents with collagen were considered and similarities and differences between chrome and vegetable tanned hide were correlated with the type of combination occurring. The dyeing of leather was reviewed in the light of conclusions reached with regard to the tanning process. Differences in behaviour between chrome and vegetable tanned leathers using acid and substantive dyes were examined. Following the discussion, another film, "The Romance of Leather," was shown.

ARGENTINE CUSTOMS CHANGE

Certain conditions regarding the sale of insecticides, fungicides, etc., in Argentina, are stipulated in Decree No. 16073/44 of July, 6. The sale of insecticides, fungicides, weed-killers and auxiliary products without the prior authorisation of the Ministry of Agriculture is prohibited. A sales authorisation must be obtained from the Registrar of Plant Therapeutics, and representatives of foreign firms must present power of attorney, accompanied by a Consular document from the place of origin, viséd by the local Argentine Consul and legalised by the Ministry of Foreign Affairs.

The sale of bulk insecticides, fungicides, weed-killers, and auxiliary products is prohibited; they must always be sold in approved containers. Labels of the products authorised must show the formula or composition printed in Spanish, in a visible place, together with the date of manufacture (if it is a product liable to alteration), instructions for use, doses to be applied, and the other data required by Law No. 11275. The full text of the decree can be seen at the Department of Overseas Trade, Hawkins House, Dolphin Square, S.W.1.

Parliamentary Topics

Salt Deposits : Availability of Penicillin

IN the House of Commons last week, Mr. Wootton-Davies asked the President of the Board of Trade if he had any up-to-date estimate as to the accessible salt deposits in this country and by whom they were owned or controlled; whether he was aware that recent advances in industrial chemistry make it possible to produce a large range of products based on coal, salt, lime and nitrogen; and whether he would take steps to ascertain what are the existing salt deposits in this country and to what extent they can be made freely available to new industries wishing to use these chemical processes.

Mr. Dalton replied that reserves of salt in this country were very large, and that he was not aware of any difficulty experienced by industries in obtaining supplies. Full information about the deposits in this country, he added, is given in Memoir No. XVIII of the Geological Survey entitled "Rock-Salt and Brine."

Caustic Soda

Mr. Liddall asked the Minister of Aircraft Production whether his attention had been drawn to the fact that, not far from the works of Magnesium Elektron, Ltd., which is running waste caustic soda out to sea from a pipeline, which cost £86,000, there is a paper mill which uses approximately the same amount of caustic soda; and what steps he proposed to take to prevent the continuance of this waste.

Sir S. Cripps stated that measures to recover this caustic soda (which is a weak solution with an appreciable percentage of common salt) would have involved capital expenditure of an order which, in view of the supply position of caustic soda, would not have been justified.

Pneumoconiosis

In reply to Mr. J. Griffiths who asked the Minister of Fuel and Power what action he proposed to take following the Report of the Committee on the problem of pneumoconiosis in the South Wales coalfield, Maj. Lloyd George stated that inter-departmental discussions were already proceeding with regard to the establishment and equipment of a Treatment and Rehabilitation Research Centre. Other arrangements, to be put into effect as soon as possible, would include the radiographic examination of all new entrants into the industry; periodical examinations of miners to assess dust associations of their employment and, in association with the Ministry of Labour, an investigation into the medical condition of miners who have left the industry. The machinery of his Department was to be strengthened for this work by appointing a second Mines Medical Officer in South Wales and by adding to the Testing Station a new section of staff to concentrate on the work of dust assessments.

DDT

Viscount Castlereagh asked the Minister of Production if, in view of the large increase in the number of flies and other germ-carrying insects and the danger of a corresponding increase in disease, he would make available to the public the disinfectant, dichlorodiphenyl-trichloroethane.

Mr. Lyttelton: The total production of DDT available to the United Nations is at present required for military use and it is not possible to release any for general civilian use. A small quantity has, however, recently been allocated to the Ministry of Health for use in air-raid shelters. Raw materials for effective fly sprays have been available to manufacturers during 1944.

Penicillin

Mr. Salt asked the Minister of Supply whether all restrictions had now been removed from the publication in this country of complete information about methods of manufacturing penicillin; and, if not, whether he would arrange for this at the earliest opportunity.

Sir A. Duncan: The methods of producing penicillin have been described in the technical press and complete information is, of course, freely exchanged between manufacturers producing under Government auspices in this country and America.

Mr. Kendall asked the Minister of Health whether in view of the fact that penicillin is available to German prisoners, for wounds or diseases of all types in which this drug is effective, he would take immediate steps to make it available for British civilians in those cases where death would otherwise result.

Mr. Willink: His Majesty's Government is required by the Geneva Convention to care for wounded prisoners of war, without distinction of nationality, equally with our own personnel. The bulk of the penicillin at present available is required for Service cases, and I regret that the amount which can be released for the treatment of civilians is not sufficient to enable penicillin to be given to every case which might conceivably benefit from it. It is necessary, therefore, to reserve this small amount for the treatment of cases in which it may be the only means of saving life or of effecting recovery from grave illness and in which the prospects of recovery are high.

After supplementary questions by Mr.

Kendall and Mr. Bowles, Mr. Kendall gave notice that he would raise this matter on the Adjournment.

British Natural Petroleum

Mr. Thorne asked the Minister of Fuel and Power if he could state the amount of oil that was now being produced in the United Kingdom; and in what part of the United Kingdom the largest amount of oil was being produced.

Mr. Lloyd: Natural petroleum is being produced in Great Britain at the rate of about 700,000 tons per annum. It is not at present desirable that the information asked for in the second part of the question should be published.

Essential Oils

Mr. A. Edwards asked the Minister of Food how many firms were included in the Essential Oils Control Scheme; and what quantities of essential oils had been imported since the scheme was introduced.

Colonel Llewellin stated that the number of firms participating as importers or merchants in the scheme for regulating the importation and distribution of essential oils varied according to the kinds of oil available and the countries from which imports are received. At present about 300 firms were operating in these capacities. Some 30 different manufacturing industries were represented in the scheme as users of essential oils. He regretted that it would not be in the public interest to reveal the quantities imported.

Cyanide of Potassium (Theft from Schools)

Sir Archibald Southby asked the Minister of Education whether his attention had been drawn to the theft from the science and chemistry cupboard of a school at Woolston, Southampton, of a quantity of cyanide of potassium; and for what purpose so large a quantity of this dangerous poison was being kept on the premises in such a way that it was possible for it to be stolen.

Mr. Butler replied that schools providing courses in chemistry commonly carried a supply of cyanide of potassium which is used as a reagent. The quantity kept at the school in question was not more than is usual, and reasonable precautions were taken to prevent access to it.

In reply to a further question, Mr. Butler said that he had thoroughly investigated this case, and found that the precautions taken were as good as could be expected in the circumstances. The whole of the cyanide was recovered by the police intact, and nobody was poisoned.

Universities Grants Committee

Captain Plugge asked what progress had been made by the Universities Grants Committee in assisting the post-war capital and revenue requirements of the universities; and when an announcement would be made.

Sir John Anderson, in a written reply, stated that the Committee discussed with representatives of all the universities their provisional estimates of post-war needs. It was now considering recommendations to the Treasury as regards assistance towards meeting additional expenditure, both annual and capital in the post-war period.

War Factories (Derequisition)

Mr. Hewlett, who asked the President of the Board of Trade how many factories had been completely vacated or derequisitioned by his Ministry and for whose peacetime uses such factories were suitable, was informed by Captain Waterhouse, in a written answer, that no figures were available of factories which might have been requisitioned at some time during the course of the war and subsequently released, and that no Government factories had as yet been vacated.

Indian Scientists

Visit to Britain

THE arrival of several distinguished Indian scientists in this country is expected in the second week of October. They expect to stay in England for about seven weeks, during which time they will visit important scientific laboratories, and industrial, medical and agricultural research institutions; they will also discuss scientific progress with a number of learned bodies.

It is understood that the party will consist of the following:—Dr. Nazir Ahmad, Director of the Cotton Technological Laboratory, Bombay; Col. S. L. Bhatia, Deputy Director-General of the Indian Medical Service; Sir Shanti S. Bhatnagar, F.R.S., Director of Scientific and Industrial Research; Sir Jnan Chandra Ghosh, Director of the Indian Institute of Science, Bangalore, and President of the National Institute of Sciences; Professor S. K. Mitra, of the University College of Science, Calcutta, chairman of the Radio Committee of the Board of Scientific and Industrial Research; Professor J. N. Mukherjee, Professor of Chemistry at Calcutta University; Professor Megh Nad Saha, F.R.S., of the University College of Science, Calcutta, the eminent physicist.

The visit of the Indian scientists follows the visit to India last winter of Professor A. V. Hill, M.P., Secretary of the Royal Society. It was then suggested that Indian scientific men should be given an opportunity of coming to the United Kingdom, and of establishing closer relations between the many new scientific organisations in India and corresponding organisations here. The scientists will be the guests of His Majesty's Government.

Prices of British Chemical Products

MOVEMENTS of supplies have again been on a steady scale and a moderate volume of fresh business has been reported in the London general chemicals market during the past week. Quotations are very firm and the market is steady. In the soda products market offers of nitrate of soda are being well absorbed at the old levels, while bichromate of soda is still available only in relatively limited quantities which are finding a ready outlet. Chlorate of soda is a very strong section and supplies are meeting with a steady demand and both Glauber salt and salt cake maintain a firm front and are fairly active. Good deliveries of hyposulphite of soda are reported. In the potash section there is a steady pressure for supplies of permanganate of potash, while bichromate of potash and yellow prussiate of potash continue to be absorbed to the full extent of the supplies available. Caustic potash is in steady demand and a ready outlet is being found for the material. Values in acid phosphate of potash are strong and offers are being steadily absorbed. In other directions the demand for all grades of borax and also for powdered arsenic, crude and refined glycerine, and sulphur, is active, and supplies are being steadily absorbed. Both formaldehyde and peroxide of hydrogen are moving steadily into consumption and values are well held. The white and red leads are meeting with a good demand. There are no changes to report from the acid section, and a fair business has been placed in most materials. The coal-tar products market maintains its strength in pretty well all directions, with most classes of both light and heavy materials moving steadily into consumption against contracts.

MANCHESTER.—The only price change of any consequence announced on the Manchester chemical market during the past week has been a fairly substantial reduction in the white and red leads. Other chemical products are on a steady to firm basis. A moderate weight of fresh business has been transacted and, on the whole, sellers have little of which to complain regarding the rate at which most of the industrial chemicals are being taken up against contracts, especially the alkalis and most of the acids. Trade in some of the fertilisers continues to show a seasonal expansion. With regard to the tar products, the possibility is being discussed among traders here of a re-opening of some of the Continental markets for pitch and other materials. In most other by-products, both light and heavy, a steady movement into consumption is reported.

GLASGOW.—Business during the past week in the home market has shown an improvement. Export inquiries remain limited. Prices keep very firm at previous levels.

Price Changes

Rises: Aluminium sulphate; sodium acetate; sodium chlorate.

Falls: Hydrochloric acid; sodium bichromate.

General Chemicals

Acetic Acid.—Maximum prices per ton: 80% technical, 1 ton £39 10s.; 10 cwt./ 1 ton, £40 10s., 4/10 cwt., £41 10s.; 80% pure, 1 ton, £41 10s.; 10 cwt./1 ton, £42 10s.; 4/10 cwt., £43 10s.; commercial glacial, 1 ton, £49; 10 cwt./1 ton, £50; 4/10 cwt., £51; delivered buyers' premises in returnable barrels, £4 10s. per ton extra if packed and delivered in glass.

Acetone.—Maximum prices per ton, 50 tons and over, £65; 10/50 tons, £65 10s.; 5/10 tons, £66; 1/5 tons, £66 10s.; single drums, £67 10s.; delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each. For delivery in non-returnable containers of 40/50 gallons, the maximum prices are £3 per ton higher. Deliveries of less than 10 gallons free from price control.

Alum.—Loose lump, £16 per ton, f.o.r.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Carbonate.—£37 10s. to £38 per ton d/d in 5 cwt. casks.

Ammonium Chloride.—Grey galvanising, £22 10s. per ton, in casks, ex wharf. Fine white 98%, £19 10s. per ton. See also Salammoniac.

Antimony Oxide.—£111 to £117 per ton.

Arsenic.—99/100%, under 1 ton, £62; 1 ton, £61; white 98/99%, £59; grey 96/97%, £54; grey 95/96%, £52; crude, £35 per ton.

Barium Carbonate.—Precip., 4-ton lots, £18 per ton d/d; 2-ton lots, £18 5s. per ton.

Barium Chloride.—98/100%, prime white crystals, £17 10s. to £19 10s. per ton, bag packing, ex works.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £18 15s. per ton d/d; 2-ton lots, £19 10s. per ton.

Bleaching Powder.—Spot, 35/37%, £11 to £11 10s. per ton in casks, special terms for contract.

Borax.—Per ton for ton lots, in free 1-cwt. bags, carriage paid: Commercial, granulated, £34; crystals, £35; powdered, £35 10s.; extra fine powder, £36 10s. B.P., crystals, £43; powdered, £43 10s.; extra fine, £44 10s. Borax glass, per ton in free 1-cwt. waterproof paper-lined bags, for home trade only, carriage paid: lump, £84 10s.; powdered, £85 10s.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid: Commercial, granulated, £62; crystals, £63; powdered, £64; extra fine powder, £66. B.P., crystals, £71; powder, £72; extra fine, £74.

Calcium Bisulphide.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid, £5 15s. per ton, ex store.

Charcoal, Lump.—£15 to £16 per ton, ex wharf. Granulated, supplies scarce.

Chlorine, Liquid.—£23 per ton, d/d in 16/17 cwt. drums (3-drum lots).

Chrometan.—Crystals, 5½d. per lb.

Chromic Acid.—1s. 5d. per lb., less 2½%, d/d U.K.

Citric Acid.—Controlled prices per lb., d/d buyers' premises. For 5 cwt. or over, anhydrous, 1s. 6¼d., other, 1s. 5d.; 1 to 5 cwt., anhydrous, 1s. 9d., other, 1s. 7d. Higher prices for smaller quantities.

Copper Oxide.—Black, powdered, about £100 per ton.

Copper Sulphate.—£32 5s. per ton, f.o.b., less 2%, in 2 cwt. bags.

Cream of Tartar.—100 per cent., per cwt., for 10 cwt., or more, £14 11s. 6d.; 5 to 10 cwt., £14 12s. 6d.; 2 to 5 cwt., £14 13s. 6d.; 1 to 2 cwt., £14 14s. 6d., d/d in sellers' returnable casks. Less than 1 cwt., 2s. 8d. to 2s. 10d. per lb. d/d. Maximum controlled prices.

Formaldehyde.—£25 to £27 15s. per ton in casks, according to quantity, d/d.

Formic Acid.—85%, £47 per ton for ton lots, carriage paid; smaller parcels quoted up to 50s. per cwt., ex store.

Glycerine.—Chemically pure, double distilled 1260 s.g., in tins, £4 to £5 per cwt., according to quantity; in drums, £3 19s. 6d. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; carriage paid for bulk lots.

Hydrochloric Acid.—Spot, 7s. 6d. to 8s. 9d. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Iodine.—Resublimed B.P., 10s. 4d. to 14s. 6d. per lb., according to quantity.

Lactic Acid.—Pale tech., £57 per ton; dark tech., £50 per ton ex works; barrels returnable.

Lead Acetate.—White, 50s. 6d. to 52s. 6d. per cwt. MANCHESTER: £51 to £54 per ton.

Lead Nitrate.—About £47 per ton d/d in casks.

Lead, Red.—English, 5/10 cwt., £45 per ton; 10 cwt. to 1 ton, £44 15s.; 1/2 tons, £44 10s.; 2/5 tons, £44; 5/20 tons, £43 10s.; 20/100 tons, £43; over 100 tons, £42 10s. per ton, less 2½%, carriage paid. Non-setting red lead, 10s. per ton dearer in each case.

Lead, White.—Dry English, less than 5 tons, £57; 5/15 tons, £53; 15/25 tons, £52 10s.; 25/50 tons, £52; 50/200 tons, £51 10s. per ton, less 5% carriage paid. Ground in oil, English, 5/9 cwt., £69; 10 cwt., £68 10s.; 1/2 tons, £67 10s.; 2/5 tons, £66; 5/10 tons, £64; 10/15 tons, £63; 15/25 tons, £62 10s.; 50/100 tons, £61 10s. per ton, less 5% carriage paid.

Litharge.—1 to 2 tons, £44 10s. per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £18 15s. to £22 15s. per ton.

Magnesium Chloride—Solid (ex wharf), £22 per ton.

Magnesium Sulphate.—Nominal.

Mercury Products.—Controlled price for 1-cwt. quantities: Bichloride powder, 15s. 8d.; bichloride lump, 16s. 3d.; mercury oxide, red cryst., 20s. 9d.; red levig., 20s. 3d.; red tech., 19s. 11d.; yellow levig., 20s. 2d.; yellow tech., 19s. 7d.; sulphide, red, 17s. 9d.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 2s. 4d. per gal.; pyridinised 64° O.P. 100 gals., 2s. 5d. per gal.

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—£60 to £65 per ton for ton lots, carriage paid, in 5-cwt. casks; smaller parcels would be dearer; deliveries slow.

Paraffin Wax.—Nominal.

Potash, Caustic.—Solid, £65 10s. per ton for 1-ton lots; flake, £73 per ton for 1-ton lots. Liquid, d/d, nominal.

Potassium Bichromate. — Crystals and granular, 7¾d. per lb.; ground, 8¾d. per lb., for not less than 6 cwt.; 1-cwt. lots, ¼d. per lb. extra.

Potassium Carbonate.—Calcined, 98/100%, £67 5s. per ton ex store; hydrated, £61 10s. per ton.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Iodide.—B.P., 8s. 8d. to 12s. per lb., according to quantity.

Potassium Nitrate.—Small granular crystals, 76s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 10d. per lb. for 1 cwt. lots; for 3 cwt. and upwards, 1s. 9½d. per lb.; technical, £7 18s. 6d. to £8 10s. 6d. per cwt., according to quantity d/d.

Potassium Prussiate.—Yellow, nominal.

Salammoniac.—First lump, spot, £48 per ton; dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £19 10s. per ton, in casks, ex store.

Soda, Caustic. — Solid 76/77%; spot, £16 7s. 6d. per ton d/d station.

Sodium Acetate.—£42 per ton, ex wharf.

Sodium Bicarbonate.—Refined, spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 6d. per lb.; anhydrous, 6d. per lb., net, d/d U.K.

Sodium Bisulphite. — Powder, 60/62%, £19 10s. per ton d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—£21 per ton d/d in minimum ton lots in 2 cwt. free bags.

Sodium Chlorate.—£36 to £45 per ton, nominal.

Sodium Hyposulphite.—Pea crystals, £21 10s. per ton for 2-ton lots; commercial, £15 per ton.

Sodium Iodide.—B.P., for not less than 28 lb., 9s. 11d. per lb., for not less than 7 lb., 13s. 1d. per lb.

Sodium Metasilicate.—£16 10s. per ton, d/d U.K. in ton lots.

Sodium Nitrite.—£20 to £23 10s. per ton for ton lots.

Sodium Percarbonate.—21½% available oxygen, £7 per cwt.

Sodium Phosphate.—Di-sodium, £26 10s. per ton d/d for ton lots. Tri-sodium, £27 10s. per ton d/d for ton lots.

Sodium Prussiate.—9d. to 9½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Sulphate (Glauber Salt).—£4 10s. per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. Spot £4 11s. per ton d/d station in bulk. MANCHESTER: £4 15s. per ton d/d station.

Sodium Sulphide. — Solid, 60/62%, spot, £18 5s. per ton, d/d, in drums; crystals, 30/32%, £12 7s. 6d. per ton, d/d, in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; pea crystals, £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.

Sulphur.—Per ton, ground, £15-£16.

Sulphuric Acid.—168° Tw., £6 10s. to £7 10s. per ton; 140° Tw., arsenic-free, £4 11s. per ton; 140° Tw., arsenious, £4 3s. 6d. per ton. Quotations naked at sellers' works.

Tartaric Acid.—Per cwt., for 10 cwt. or more, £19 12s.; 5 to 10 cwt., £19 13s. 6d.; 2 to 5 cwt., £19 15s.; 1 to 2 cwt., £19 17s. Less than 1 cwt., 3s. 7d. to 3s. 9d. per lb. d/d, according to quantity. Maximum controlled prices.

Tin Oxide.—Nominal.

Zinc Oxide.—Maximum prices per ton for 2-ton lots, d/d; white seal, £34; green seal, £33; red seal, £31 10s.

Zinc Sulphate.—Tech., £20-£21 per ton, carriage paid, casks free.

Rubber Chemicals

Antimony Sulphide.—Golden, 1s. 2d. to 2s. 1½d. per lb. Crimson, 2s. 2d. to 2s. 6d. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Best white bleached, £8 3s. 6d. per ton.

Cadmium Sulphide.—6s. to 6s. 6d. per lb.

Carbon Bisulphide.—£34 to £39 per ton, according to quality, in free returnable drums.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Tetrachloride.—£44 to £49 per ton, according to quantity.

Chromium Oxide.—Green, 2s ped lb.

India-rubber Substitutes.—White, 6 3/16d. to 10½d. per lb.; dark, 6 3/16d. to 6 15/16d. per lb.

Lithopone.—30%, £25 per ton; 60%, £31 to £32 per ton. Imported material would be dearer.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, "Rupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£49 per ton.

Vermilion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Plus 5% War Charge.

Nitrogen Fertilisers

Ammonium Phosphate.—Imported material, 11% nitrogen, 48% phosphoric acid, per ton d/d farmer's nearest station, in October, £20 2s. 6d. Increased charge of 2s. 6d. per month up to March, 1945.

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, in October, £9 13s. Increased charge of 1s. 6d. per month up to March, 1945.

Calcium Cyanamide.—Nominal; supplies very scanty.

Concentrated Fertilisers.—Per ton d/d farmer's nearest station, in October: I.C.I. type "Special No. 1," £14 19s. Increased charge of 2s. 6d. a month up to March, 1945.

"Nitro Chalk."—£9 14s. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean super-refined for 6-ton lots d/d nearest station, £15 5s. per ton; granulated, over 98%, £14 10s. per ton.

Coal Tar Products

Benzol.—90's, 2s. 2d.; nitration grade, 2s. 6d. per gal., ex works.

Carbolic Acid.—Crystals, 11½d. per lb. Crude, 60's, 4s. 3d. to 4s. 6d., according to specification. MANCHESTER: Crystals, 9¾d. to 11½d. per lb., d/d; crude, 4s. to 4s. 6d., naked, at works.

Creosote.—Home trade, 6½d. to 7d. per gal., f.o.r. maker's works. MANCHESTER, 6½d. to 9¾d. per gal.

Cresylic Acid.—Pale, 97%, 3s. 6d. per gal.; 99%, 4s. 2d.; 99.5/100%, 4s. 4d. American, duty free, 4s. 2d., naked at works. MANCHESTER: Pale, 99/100%, 4s. 6d. per gal.

Naphtha.—Solvent, 90/160°, 2s. 8d. per gal. for 1000-gal. lots; heavy, 90/190°, 2s. 2d. per gal. for 1000-gal. lots, d/d. Drums extra; higher prices for smaller lots. Controlled prices.

Naphthalene.—Crude, ton lots, in sellers' bags, £7 4s. to £10 13s. per ton, according to m.p.; hot-pressed, £12 9s. to £12 14s. per ton, in bulk ex works; purified crystals, £20 15s. to £36 15s. per ton. Controlled prices.

Pitch.—Medium, soft, 50s. to 55s. per ton, f.o.b. MANCHESTER: 60s. to 62s. per ton f.o.b.

Pyridine.—90/140°, 17s. to 17s. 6d. per gal.; 90/160°, 13s.—MANCHESTER, 13s. 6d. to 18s. per gal.

Toluol.—Pure, 2s. 7d. per gal.; 90's, 1s. 11d. per gal. MANCHESTER: Pure, 2s. 7½d. per gal. naked.

Xylol.—For 1000-gal. lots, 3s. 1½d. to 3s. 4d. per gal., according to grade, d/d. Drums extra; higher prices for smaller lots. Controlled prices.

Wood Distillation Products

Calcium Acetate.—Brown, £21 per ton; grey, £24. MANCHESTER: Grey, £24 to £25 per ton.

Methyl Acetone.—40/50%, £56 per ton.

Wood Creosote.—Unrefined, about 2s. per gal., according to boiling range.

Wood Naphtha, Miscible.—4s. 6d. to 5s. 6d. per gal.; solvent, 5s. 6d. per gal.

Wood Tar.—£5 per ton.

Intermediates and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—Nominal.

o-**Cresol** 30/31° C.—Nominal.

p-**Cresol** 34/35° C.—Nominal.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb; 66/68° C., 1s.

p-**Nitraniline.**—2s. 5d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyer's works.

Nitronaphthalene.—1s. 2d. per lb.; P.G., 1s. 0½d. per lb.

o-**Toluidine.**—1s. per lb., in 8/10 cwt. drums, drums extra.

p-**Toluidine.**—2s. 2d. per lb., in casks.

m-**Xylidine Acetate.**—4s. 5d. per lb., 100%

Latest Oil Prices

LONDON.—October 4.—For the period ending November 4 (October 14 for refined oils), per ton, naked, ex mill, works or refinery, and subject to additional charges according to package: LINSEED OIL, crude, £62. RAPESEED OIL, crude, £85. COTTONSEED OIL, crude, £52 2s. 6d.; washed, £55 5s.; refined edible, £57; refined deodorised, £58. COCONUT OIL, crude, £49; refined deodorised, £49; refined hardened deodorised, £53. PALM KERNEL OIL, crude, £48 10s.; refined deodorised, £49; refined hardened deodorised, £53. PALM OIL, refined deodorised, £55; refined hardened deodorised, £58. GROUNDNUT OIL, crude, £56 10s.; refined deodorised, £58; refined hardened deodorised, £62 to £63. WHALE OIL, crude hardened, 42 deg., £51 10s.; refined hardened, 46/48 deg., £52 10s. ACID OILS: Groundnut, £40; soya, £38; coconut, and palm-kernel, £43 10s. ROSIN, 30s. 6d. to 45s. per cwt., ex store, according to grade. TURPENTINE, American, 87s. per cwt. in drums or barrels, as imported (controlled price).

General News

Alloy cast iron for use at low temperatures is the subject of Specification D.T.D. 649 issued by the Ministry of Aircraft Production (H.M.S.O., post free, 7d.)

The Labbydish factory, County Donegal, Eire, has resumed distillation of alcohol from potatoes, as surplus supplies were available for a limited time.

A White Paper (Cmd. 6,555, price 1d.) containing the agreement on petroleum between Britain and the United States which was signed in Washington on August 8, was issued on September 27.

The British Colour Council has just issued six basic colour types for men's suitings, offering a relief from the uniform colours of the Fighting Services and forming a basis for a great variety of colour schemes and effects.

Lord Trent, chairman of Boots Pure Drug Co., Ltd., has handed to Mr. R. W. Haddon, C.B.E., chairman of the Red Cross Agricultural Fund, a cheque for £3058 19s. 9d., the proceeds of one afternoon's gymkhana and horticultural show activities at Nottingham on September 9.

The Ministry of Supply has fixed selling prices of the following grades of Talc: Indian Talc XX, £23 10s. per ton (gross for net) for lots of 1 ton and over: £26 10s. for lots of 5 cwt. and over, but not exceeding 1 ton. Prices for Indian Talc XXX are £23 10s. and £26 10s. respectively. All prices are delivered consumer's works.

The Ministry of Food announces that the only changes in the existing prices of unrefined oils and fats and technical animal fats allocated to primary wholesalers and large trade users, during the five weeks ending November 4, are: Acid Oils (per ton naked ex works): Whale Oil/Herring Oil reduced to £36 15s.; Whale Oil Hardened reduced to £39.

Scientific activities mentioned in the annual report for 1943/44 of The British Council include the provision of vitamins, drugs, microscopes and other apparatus urgently needed by China, through the British Council Cultural Scientific Mission to China, headed by Dr. Joseph Needham. The exchange of books and scientific material between Britain and the U.S.S.R., arranged through the British Council, has continued to increase. Furthermore, plans for providing schools and universities in liberated Europe with the necessary books, stationery, laboratory apparatus, radio sets and film projectors are among subjects discussed by the Conference of Allied Ministers of Education, established under the initiative of the British Minister of Education and the Chairman of the Council.

From Week to Week

Olive oil will be supplied to chemists without a permit from October 15, announces the Ministry of Food. It must still be sold only by prescription issued by a qualified medical practitioner; it must not be sold for any other purpose nor used in compound preparations. As the increased supplies of olive oil recently made available for distribution should be sufficient to meet the whole of the requirements of prescription holders, no supplementary allocations will be made.

The Ministry of Supply has for disposal small quantities of carnauba and ouricuri waxes, grades: fatty grey, light fatty grey, prime yellow, franklin, and ordinary. Stocks are held in Lancashire and all sales will be made on an ex store basis. Offers are invited based on current market prices and should be sent to Ministry of Supply, Sundry Materials Branch, 10 Old Jewry, London, E.C.2, marked "Carnauba or Ouricuri Wax Offer" on the top left-hand corner of the envelope.

By permission of the Director-General of Research and Development, Ministry of Supply, Armament Research Department, Electrodeposition Memorandum No. 5, entitled "Notes on the Inspection of Heavy Electrodeposits of Nickel and Chromium" is being released for publication. Copies may be obtained on application to the Liaison Officer, Chief Superintendent of Armament Research, c/o S.T.A.M., Room No. 1043, Shell Mex House, Strand, W.C.2.

Among the many charges of inefficiency laid against the coal industry recently by ill-informed critics has been the apparent omission of responsible bodies to examine or exploit the process of underground gasification of coal as practised abroad, and for which all manner of extravagant claims have been made. In order to clarify the position, and to bring the subject into true perspective, Dr. Foxwell, the eminent fuel technologist, has dealt with the subject in the *Iron and Coal Trades Review* (August 25, 1944).

Foreign News

A match company has recently been established in Guatemala.

Peru imported, in 1943, chemical products worth 50,268,164 soles, an increase of 14,297,284 soles over the preceding year.

The reconditioning of the largest quartzite mine in the Ukraine, near Zhitomir, is progressing.

The Kiangsi Hsin Yi Corporation, China, will invest CN$18,500,000 in chemical works in 1944.

The establishment of an Inter-American Institute of Agricultural Sciences has been approved by the U.S. Senate.

Several cardboard factories in Palestine now use waste materials on a large scale as the basis for their products.

Yeast, an important source of vitamins, is being made in a rayon plant in Hamburg, production amounting to 50-60 tons daily.

In Southern Rhodesia, the Industrial Development Advisory Committee is making efforts to establish a chemical industry, based on chrome and barytes.

The Peruvian Government is sending an expedition into the upper Madre de Dios region to study the petroleum possibilities of the area.

A match factory established in Hunan Province, China, plans an annual production of 6000 cases. Phosphorus supplies are obtained from a plant near Kunming.

Argentina's sulphur production in 1943 is estimated at about 18,000 tons. Efforts are being made to double the output this year to provide an export surplus.

Three new petroleum companies, with a capital of 100,000 pesos each, were formed in Colombia during May. All are subsidiaries of U.S. concerns.

For the production of refined lead in Brazil a Government-owned plant has been established at Apiai (S. Paulo) with an annual capacity of 6000 tons.

A board has been established in Costa Rica which will be responsible for the distribution of the quota of penicillin assigned to Costa Rica by the United States.

Large orders for anaesthetic ether, ethyl chloride, ichthyol, and dental products have recently been placed with manufacturers in Palestine by Egyptian importers.

From Argentina comes the news that consumption of calcium carbide has increased considerably in recent years as a result of the expansion of local industries.

Exploration activities for oil in Ecuador are being intensified, both in the coastal area and in the Oriente Province. Although prospects are good, no oil in commercial quantities has yet been struck.

The Swiss Federal Office for War Economy states that bones are now being used in the manufacture of a number of products, including materials for dressing and impregnating cloth, as well as lubricating oils.

The Donbas chemical plants are being restored and are rapidly preparing to resume production. Equipment and supplies are arriving in Konstantinovka, Slavyansk, Gorlovka and Stalino, and large numbers of construction workers have been transferred from Central Russia to speed up reconstruction. All principal branches of the Donbas chemical plants are expected to be in operation before the end of 1944.

Production of totaquina from cinchona bark grown in Tanganyika is now being undertaken by an enterprise at Dar-es-Salaam. This plant, the first of its kind in British East Africa, is working two shifts daily.

A new ammonia factory has been opened by the North-China Nitric Fertilizer Company at Attaiyun in the Shansi Province of China. The same firm proposes to enter the tar industry field, using as raw materials the coal and gypsum deposits of Shansi.

In Peru, several new industrial establishments have opened in the Lima area, including a factory for the production of metallic dental compounds, and a concern for the production of an insecticide used as a dusting powder against cotton pests.

Manufacture of a new kind of glass which contains relatively little lead and is of great transparency and insulating power, has been started by the United Incandescent Lamp Works, Ltd., Ujpest, Hungary. The lead content of the glass is kept below 20 per cent. or, alternatively, the lead oxide is totally substituted by other oxides, the total amount of which may reach 1-10 per cent. in the finished glass. Sufficient fluorine is added to bring the fluorine content of the glass up to 0.3-6 per cent.

Forthcoming Events

The inaugural meeting of the North-Western branch of the **Institution of Chemical Engineers** will be held on **October 7,** at 3 p.m., in the Reynolds Hall, College of Technology, Manchester, 1. A paper entitled: "Some Developments in Ceramics" will be read by Mr. C. S. Garland (past president).

The Leeds local area section of the **Chemical Society** meets in the Chemistry Lecture Theatre of the University of Leeds, on **October 9,** at 6.30 p.m., when a paper entitled "Some Trends in Chemical Spectroscopy and the Study of Large Molecules" will be presented by Dr. W. H. Thompson.

The annual luncheon of the **Institute of Fuel** will be held at the Connaught Rooms, London, W.C.2, on **October 12** (12.30 for 1 p.m.). Lord Woolton will be the principal guest. The President, Dr. E. W. Smith, will address the meeting, and Dr. J. G. King will deliver the Melchett Lecture at 2.15 p.m.

Professor Sir Lawrence Bragg, O.B.E., Sc.D., F.Inst.P., F.R.S., will address the Scottish branch of the **Institute of Physics,** at 7 p.m., on **October 13,** in the Natural Philosophy Department of the University of Glasgow. His subject will be "The Physics of the Solid State."

The **Association of Austrian Engineers,**

Chemists and Scientific Workers in Great Britain meet, on **October 13,** at 6.45 p.m., at the Austrian Centre, 69 Eton Avenue, N.W.3. Dr. J. Coutts, Chief Pharmacists of St. Bartholomew's Hospital, and Dr. Medwei will deliver a lecture on "Therapeutics in Austria and Great Britain."

The annual meeting of the **Society of Chemical Industry,** which was postponed in July, will take place on **October 13,** at 2.30 p.m., at the Royal Institution, Albemarle Street, W.1. The proceedings will commence with the conferment of Hon. Membership of the Society on Dr. Wm. Cullen, to be followed by the presentation of the Messel Medal to Professor A. V. Hill, F.R.S., who will read his address entitled "Science in India." Tea will be served in the wing library at 4 p.m.

A joint meeting of the South Wales section of the **Royal Institute of Chemistry** with the Swansea branch of the **Association of Scientific Workers** takes place, on **October 14,** at University College, Swansea, at 3 p.m. Mr. G. E. Coates will present a paper entitled "Some Applications of Nuclear Physics."

The North-Western section of the **Institute of Fuel** meets, on **October 18,** at the Engineers Club, Manchester, at 2.30 p.m., to hear Mr. G. N. Critchley deliver the second paper in the series on thermal insulation on "The Economics of Saving Fuel with Particular Reference to the Insulation of Steam Ranges."

The **British Association of Chemists** (London section) have arranged for a public meeting to be held at the Wigmore Hall, at 6.30 p.m., on **October 18,** to discuss "The Safeguarding of Key Industries." Mr. Norman Sheldon, A.R.C.S., F.R.I.C., chairman of the Safeguarding of Key Industries (Scientific Equipment and Materials) Committee, will open the discussion by proposing a resolution urging the Government to give immediate and special consideration to the maintenance and development in Great Britain of those industries formerly covered by the Safeguarding of Industries Act (Part 1). Members of every scientific society are urged to attend. Anyone who would like to take part in the discussion and would care to have advance information of the proposals which will be put forward is invited to write to the Safeguarding of Key Industries Committee, 19 Charing Cross Road, London, W.C.2.

The Leicester section of the **Institution of the Rubber Industry** meets, on **October 19,** to hear Dr. G. Gee read a paper on "The Behaviour of Rubber in Mixed Liquids."

The annual general meeting of the **British Rheologists' Club** will be held on **October 21,** at 2.30 p.m., at the University, Reading. Papers on "The Measurement of Tack" will be read by Dr. N. A. de Bruyne and Dr. R. F. Bowles.

Company News

Murex, Ltd., has made a profit, for the year ended June 30, of £439,446 (£516,507). Total distribution on the ordinary stock is unchanged at 20 per cent.

South African Torbanite Mining and Refining Company, Ltd., reports, for the year ended June 25, a net profit of £80,504 (£42,453). A dividend of 10 per cent. has been declared (nil).

The Palestine Potash Company, Ltd., has notified holders of the £19,837 7½ per cent. cumulative and of the £348,962 5½ per cent. participating cumulative preference shares that these will be redeemed on January 1, 1945, at 21s. and at 22s. 6d. per share, respectively. Arrangements have also been made for the redemption, at 102 per cent., on December 31, of the outstanding £175,000 7½ per cent., and £75,000 5½ per cent. unsecured notes. Holders of the 5½ per cent. pref. shares may convert up to two-thirds of their holdings into "A" ordinary shares on payment of 52s. 6d. per share.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *— followed by the date of the Summary, but such total may have been reduced.)

HADHAM LIME WORKS LTD., Little Hadham. (M., 7/10/44.) September 11. £700 deb., to E. W. Green, Dunstable; general charge.

WELDED PRODUCTS (CARLISLE) LTD., Newcastle-on-Tyne. (M., 7/10/44.) September 9, series of £1500 (not ex.) debs., present issue £1000; general charge.

ABBEY PLATING WORKS, LTD., Wembley, electro platers. (M., 7/10/44.) September 15, mortgage and charge, to National Provincial Bank, Ltd., securing all moneys due or to become due to the Bank: charged on land and buildings, at Wycombe Road, Beresford Avenue, Wembley, with plant, etc., also general charge. *——. September 27, 1941.

Satisfactions

ABBEY PLATING WORKS LTD., Wembley. (M.S., 7/10/44.) Satisfaction September 13, of mortgage registered July 3, 1944.

ENGLISH MANUFACTURING CHEMISTS LTD., London, S.W. (M.S., 7/10/44.) Satisfaction September 12,

£246,379 16s. 10d., registered January 19, 1938.

Companies Winding-up Voluntarily

LONGWORTHS OF SPRINGFIELD, LTD. (C.W.U.V., 7/10/44.) September 14. By special resolution. H. Johnson, Blackfriars House, Parsonage, Manchester, appointed liquidator.

MABOR, LTD. (C.W.U.V., 7/10/44.) September 27. By special resolution. Henry Clement Medlam, 95A Chancery Lane, London, W.C.2, appointed liquidator.

THE TRUQUAL CHEMISTS PURE SUPPLIES ASSOCIATION, LTD. (C.W.U.V., 7/10/44.) By special resolution. September 18. Frederick Charles Fairclough, Bank Chambers, Wallgate, Wigan, appointed liquidator.

New Companies Registered

Lowland Chemicals, Ltd. (22,941).—Private company, registered in Edinburgh. Capital: £1000 in 1000 shares of £1 each. Chemical manufacturers, electro-chemists, merchants in all kinds of chemicals, etc. F. Nettler is the first director. Registered office: 28 Queen Street, Glasgow.

North-Western Laboratories, Ltd. (390,003).—Private company. Capital: £5000 in 5000 shares of £1 each. Technical, industrial, analytical, research and manufacturing chemists, bleachers, dyers, etc. Directors: W. Crossley; B. C. Houlden; H. Hoyle. Solicitors: Skelton & Co., 90 Deansgate, Manchester.

Chemical and Allied Stocks and Shares

STOCK markets have been quiet with small movements in most sections. British Funds continued firm with an upward tendency under the lead of 3½ per cent. War Loan, and industrial shares generally were well maintained, although sentiment tended to be affected by the difficulty of assessing the ultimate effects of the Government's social security proposals. The latter continued to dominate insurance shares and in cases where sharp declines were recorded a week ago, little recovery in prices has been shown.

Imperial Chemical were firmer at 38s. 3d., Turner & Newall little changed at 79s. 9d., while Dunlop Rubber were favoured on market views of post-war prospects and moved up to 46s. 6d. British Aluminium at 46s. 9d. lost an earlier small rise, British Oxygen were 86s. 9d., and Borax Consolidated 36s. Lever & Unilever continued favoured on the results and encouraging views of the outlook, rising further to 44s. 3d., and Lever N.V. were 45s. 3d. Awaiting the dividend announcement, Tube Investments shares further rose to 95s., while United Steel were firmer at 24s. 9d. results also being due shortly in this case. Stewarts & Lloyds deferred were 54s. 3d., Guest Keen 37s. 6d., Thomas Firth & John Brown ordinary also strengthening to 70s. Elsewhere, Allied Iron eased to 51s. 9d., while at 19s. 3d. Amalgamated Metal failed to hold all an earlier improvement. J. Brockhouse moved higher to 77s. 6d., and Pressed Steel ordinary were 30s. 6d. Murex eased from 95s. to 93s. 9d. on the lower profits. In other directions, De La Rue moved up to 184s. 4½d., Erinoid 5s. ordinary remained at 11s. 3d. awaiting the results, while British Industrial Plastics 2s. ordinary were 7s. 3d. Wall Paper Manufacturers deferred recovered to 42s. 6d. on hopes that the results may show increased profits, International Paint were 115s., and Lewis Berger 106s. Barry & Staines were 51s. 3d., and Nairn & Greenwich eased to 71s. 3d., although elsewhere, United Molasses firmed up to 36s., Distillers to 103s. 3d., and British Plaster Board were an active feature at 39s. Associated Cement have been firmer at 66s. Gas Light & Coke ordinary were 23s. 7½d. United Gas Industries 1s. deferred shares were lowered to 15s. 6d. on reduction from 125 per cent. to 100 per cent. in the dividend. At Sheffield, Newton Chambers moved up to 53s. reflecting recognition of the favourable yield and the company's good dividend record over a long period.

Textiles were quiet with Bradford Dyers 23s. 7½d. Bleachers 12s. 6d., Fine Spinners 24s. 6d., and Calico Printers 16s. 6d. At 55s. 6d. Courtaulds were little changed on balance, while British Celanese were 28s. Awaiting the financial results, Triplex Glass fluctuated and at 41s. lost an earlier improvement. The social security proposals tended to assist sentiment in regard to Boots Drug, which were firm at 56s. 9d., while Timothy Whites improved to 39s. 4½d., and Sangers to 28s. 4½d.

General Refractories at 16s. 10½d. regained part of an earlier reaction, while Imperial Smelting became firmer at 14s. 4½d. Greeff-Chemicals 5s. ordinary were 8s., and Monsanto Chemicals 5½ per cent. preference 23s. B. Laporte continued firm at 83s. awaiting the interim dividend announcement. Burt Boulton were 24s. 6d., Cellon 5s. ordinary 25s., and British Drug Houses 26s. 6d. At 41s. 3d. British Match have been well maintained. Low Temperature Carbonisation 2s. ordinary changed hands around 2s. 7½d. Babcock & Wilcox were firm at 49s. 9d., pending declaration of the interim dividend. T. W. Ward strengthened to 36s. 9d. In this case the financial results are due shortly. Oil shares were less inactive with slightly lower levels ruling for "Shell," Anglo-Iranian, and Trinidad Leaseholds.

LANCASHIRE **BOILERS**, etc. One 30 ft. by 8 ft. for 200 lbs. pressure; three 30 ft. by 8 ft. 6 in. for 170 lbs. pressure; one 30 ft. by 9 ft. for 150 lbs. pressure; one 20 ft. by 6 ft. Cornish, 80 lbs. pressure. **CHEMICAL PLANT, TANKS**, etc. "Wikner" De-hydrating **STILL**, 13 ft. 6 in. by 6 ft. 4 in. by 6 ft. deep, with all equipment. Anthracene Grease **CONDENSER**, 3 ft. dia., 5 ft. deep; three **PREHEATERS**, 4 ft. dia., 7 ft. deep; Four **CONDENSERS**, 5 ft. dia., 5 ft. deep; Tar Regulating **TANK**, Vertical Tabular **HEATER**, 10 ft. high, 2 ft. dia., 200 lbs. pressure riveted shell. Two 30 ft. by 8 ft.; one 30 ft. by 9 ft.; two 28 ft. by 7 ft. **BOILER SHELLS**. Three 30 ft. by 9 ft. dia. light shells; three 22 ft. by 7 ft.; one 15 ft. by 5 ft.; one 15 ft. by 4 ft.; one 13 ft. 6 in. by 4 ft. 6 in.; one 10 ft. by 3 ft. dished end Receiver. One 5 ft. cube welded **TANK**. Boat Shaped **PANS**; two 22 ft. by 7 ft. by 4 ft. 6 in. deep; four 22 ft. by 7 ft. by 3 ft. 6 in deep. **STEAM ENGINES** and **PUMPS**, etc.
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